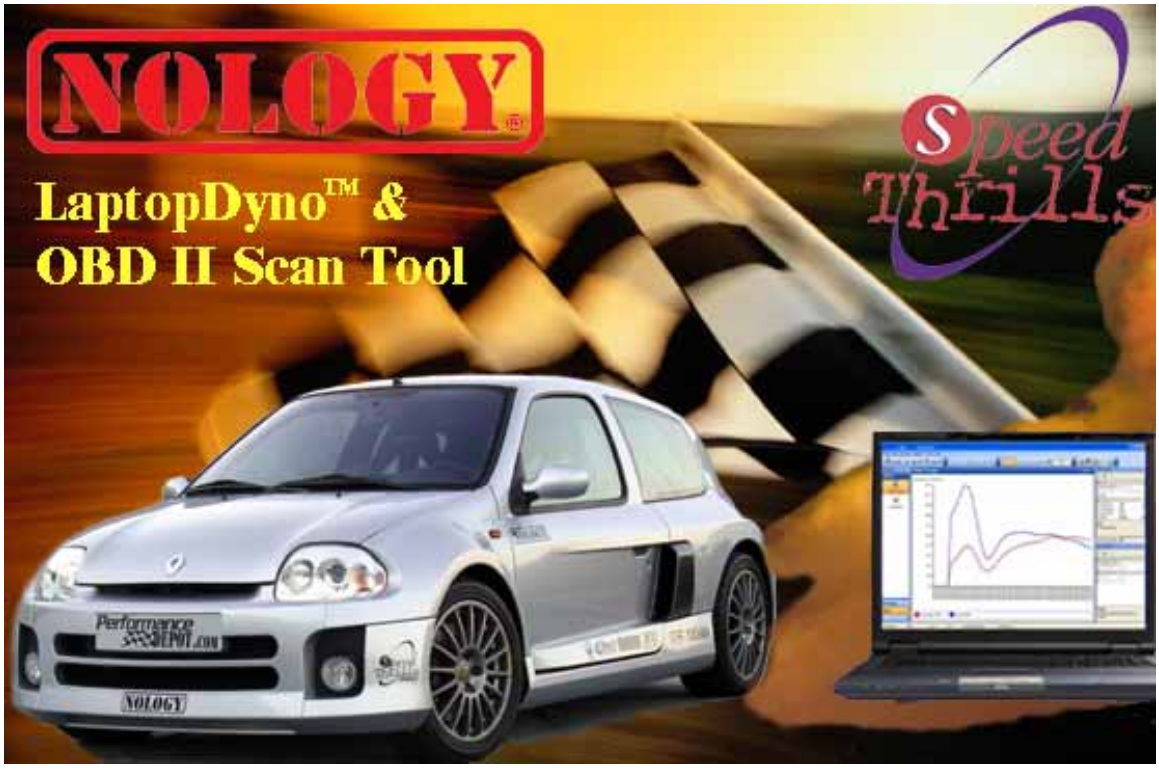
User Manual

Laptop-Dyno™ & OBD II Scan Tool

For Windows (Version 5.2)



Nology Engineering, Inc.
1945 S Rancho Santa Fe Rd.
San Marcos, CA 92078
Tel. 760-591-0888
Fax. 760-591-0880
www.nology.com
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Warnings

The exclamation point within the triangle is a warning sign alerting you of important instructions accompanying the product. Please observe all warnings.

Do not operate the vehicle indoors. A running engine produces lethal carbon monoxide exhaust fumes that can seriously harm or kill you if inhaled. Only run the vehicle motor outdoors with proper ventilation. Many scan tool operations do not require a running motor.

Do not attempt to operate or observe the scan tool while driving a vehicle. Driving requires the full attention of the driver. Operating or observing the scan tool will cause driver distraction and could cause a fatal accident.

Ensure the PC, cable, and OBD II adapter do not interfere with the vehicle controls. A cable dangling in front of the foot pedals, gear shifter, or steering wheel can interfere with vehicle operation and cause a fatal accident. Always ensure the PC, cable, and OBD II adapter are securely fastened out of the way. If the scan tool cannot be safely attached as to not interfere with the vehicle controls, then do not drive the vehicle with the OBD II adapter connected to the vehicle.

Never race or exceed the posted speed limit while on public highways. The dynamometer operations require accelerating to high speeds. Always uses a closed course raceway when performing dynamometer and acceleration tests.

NOLOGY DOES NOT SUPPORT STREET RACING

WARNING: Obey all traffic laws when using the Laptop-Dyno™. The Laptop-Dyno™ is not intended for street use. Use only in designated areas, closed courses and racetracks.

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Patents

Patent Pending.

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CHAPTER 1

Preface

Congratulations on your purchase of a Nology's Laptop-Dyno™ for Windows. Please take time to read through these operating instructions and become familiar with the operating procedure.

The Nology Laptop-Dyno™ for Windows, in conjunction with your personal computer, enables access to your vehicle's diagnostic information.

The scan tool offers features such as read and clear trouble codes, turn off the "Check Engine" light, and display live sensor data from the vehicle. The Dyno software adds a performance-measuring package that includes a dynamometer, acceleration tests, and fuel economy measurements.

Key Features

Laptop-Dyno™ for Windows offers a multitude of diagnostic and performance-measuring features:

- All 1996 and later vehicles supported, including American, Asian, and European
- Read and clear diagnostic trouble codes (DTCs)
- Integrated DTC description databases including enhanced and generic definitions
- Turn off the vehicle's Check Engine or Service Engine Soon light
- Read and clear freeze frame data
- Monitor live sensor data with line graphs, bar graphs, and meters
- Graphically zoom in/out and pan within a virtual trace buffer
- View multiple sensors simultaneously with variable sample rates
- Record and playback live sensor data streams
- Export recording to a spreadsheet for further analysis
- Graphical oxygen sensor monitoring and on-board test results
- I/M readiness. Metric and English units of measure
- Horsepower and torque measurements
- 0-60 time, 1/8 and 1/4 mile time and speed, MPG, and top speed
- Supports Windows 98 and higher

- Color and black-and-white screens supported
- 1-year warranty

Minimum Platform and Software Requirements

You must have one of the following operating systems with Microsoft Internet Explorer 5.01 or later installed on your computer:

- Microsoft® Windows® 98
- Microsoft® Windows® 98 Second Edition
- Microsoft® Windows® Millennium Edition (Windows Me)
- Microsoft® Windows NT® 4 (Workstation or Server) with Service Pack 6a
- Microsoft® Windows® 2000 (Professional, Server, or Advanced Server) with the latest Windows service pack and critical updates available from the Microsoft Security Web site (www.microsoft.com/security).
- Microsoft® Windows® XP (Home or Professional)
- Microsoft® Windows® XP Media Center Edition
- Microsoft® Windows® XP Tablet PC Edition
- Microsoft® Windows® Server 2003 family

Minimum hardware requirements:

- Pentium 166MHz or faster
- 64MB of RAM or higher

Nology Laptop-Dyno™ for Windows

The Laptop-Dyno™ for Windows is comprised of four components:

- OBD II Adapter and Software
- OBD II Cable
- RS-232 null modem cable
- Windows laptop or desktop PC (purchased separately)

Figure 1: PC, RS-232 cable, OBD II Adapter, and OBD II Vehicle Connect Cable

What is OBD II?

OBD II stands for On-Board Diagnostics second generation. OBD II was incorporated on some 1994 and 1995 model-year vehicles and was required for all 1996-and-later vehicles.

OBD II is a series of government regulations intended to reduce in-use vehicle emissions by continually monitoring for failure and/or deterioration of the powertrain and its emission-control systems. A Malfunction Indicator Light (i.e. Check Engine light or Service Engine Soon light) visible to the vehicle operator will be illuminated and a Diagnostic Trouble Code set when either there is a failure of a monitored component/system or any of the sensed parameters deteriorates such that the vehicle's emissions would exceed the relevant standard by approximately 50 percent.

The OBD II standard makes the Nology Laptop-Dyno™ for Windows universal to all automobiles, since all newer vehicles sold must conform to these government regulations.

OBD II standardizes all vehicle communication protocols. The Nology Laptop-Dyno™ for Windows uses the OBD II connector located under the dash to communicate with the vehicle's on-board computer systems.

Where is the vehicle's OBD II connector?

OBD II compliant vehicles must have a 16-pin connector located in plain sight underneath the dash near the driver's seat (see Figure 2). Alternatively, it may be behind ashtrays or concealed by an easily removed plastic cover, sometimes with the letters "OBD" stamped on the outside. Some 1994 and 1995 vehicles have this connector and are only OBD I compliant. These OBD I vehicles are not supported by the scan tool.

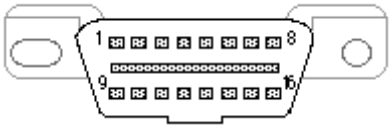


Figure 2: Vehicle OBD II Connector (Front View)

What is a Scan Tool?

Modern automobiles rely upon computers to control and monitor all aspects of vehicle operation. When most people think of computers, they think of a desktop system such as an Apple Macintosh

or an IBM PC-compatible. However, small computer microchips silently perform many mundane tasks without the average person being aware of their existence. Today's automobile contains numerous on-board computer chips responsible for many systems such as the engine, transmission, and antilock brakes to name a few.

The automobile computer relies upon a variety of sensors to monitor vehicle operation such as speed, engine RPM, coolant temperature, and oxygen sensors. While driving, if the vehicle's on-board computer system detects a problem, the computer reports the error using a Diagnostic Trouble Code (DTC). The Code number indicates the problem with the vehicle. For instance, Diagnostic Trouble Code P0503 means the vehicle speed sensor is intermittently not providing the correct reading.

The scan tool connects to the vehicle using a standard, easy-to-locate electrical connector. No tools are required to access the connector. Once connected, the scan tool communicates with the vehicle's computer to obtain diagnostic information, such as a Diagnostic Trouble Code.

If the vehicle computer detects a problem, the driver is informed using the "Check Engine" or "Service Engine Soon" light on the vehicle's dashboard. This light is also known as the Malfunction Indicator Light (MIL). When this light illuminates, a Diagnostic Trouble Code is saved into the vehicle's computer memory ready for the Nology Laptop-Dyno™ for Windows to read out the value.

Not all Diagnostic Trouble Codes illuminate the Check Engine light. Sometimes the vehicle needs to see an error a few times to ensure the problem isn't just a temporary glitch. Other times the computer determines the problem isn't emission related and the driver is not notified. Therefore, periodic checking of the Diagnostic Trouble Codes helps detect problems early, before becoming more costly to repair. For instance, the computer may detect a problem with the automatic transmission but since the failure is not emission related the computer may not illuminate the Check Engine light. The transmission failure may also be difficult for the driver to detect just by driving the vehicle. Only a scan tool can reveal that a problem exists and identify the cause.

Specifications

The Laptop-Dyno™ OBD II Adapter conforms to these specifications.

Table 1: Hardware Specifications

Vehicle Protocol Input:	VPW, PWM, ISO, Keyword Protocol (KWP) 2000, and CAN[1].
External Power:	None. Draws power from vehicle.
Weight:	4 oz
Dimensions (H x W x D):	3.5" x 1.75" x .875"
Temperature:	32° to 158° F (0° to 70° C) non-condensing

Supported Vehicles

Nology Laptop-Dyno™ for Windows supports all 1996 and newer vehicles, including American, European, and Asian models. Some 1994 and 1995 vehicles are also supported with a sticker under the hood indicating OBD II compliance. All vehicles sold in the US model year 1996 and newer are OBD II compliant and do not require the under hood sticker.

[1] Not all OBD II adapters are equipped with CAN.

The OBD II Adapter supports the following automotive standard interfaces: VPW, PWM, ISO, Keyword Protocol (KWP) 2000, and optionally CAN.

Abbreviations

Some item descriptions are abbreviated within the software.

BX – designates a bank number (e.g. B1 means bank 1)

SX – designates a sensor number (e.g. S1 means sensor 1)

BX-SX – designates a bank-sensor combination (e.g. B1-S2 means bank 1 – sensor 2)

Abbreviations and Definitions

A/F – Air Fuel

A/T – Automatic Transmission

Check Engine Light – also known as a MIL (Malfunction Indicator) light.

CHT – Cylinder Head Temperature

Closed Loop – In closed loop operation the oxygen sensors are used to adjust the fuel mixture. See open loop.

DTC – Diagnostic Trouble Code

Dyno - Dynamometer

EBCM – Electronic Brake Control Module

EBTCM – Electronic Brake Traction Control Module

ECU – Emission Control Unit (i.e. the vehicle's on-board computer)

EGR – Exhaust Gas Recirculation

EFI – Electronic Fuel Injection

EMR – Electronic Module Retard

ESC – Electronic Spark Control

EST – Electronic Spark Timing

EVAP – Evaporative Emission

Fuel Trim – engine computer function that keeps the air/fuel mixture close to ideal.

HC – Hydrocarbons

HEI – High Energy Ignition

HO2S – Heated Oxygen Sensor

Horsepower – a unit of measure to express the rate at which mechanical energy is expended.

HP – Horsepower

M/T – Manual Transmission

MAF – Mass Air Flow

MIL – Malfunction Indicator Light (i.e. "Check Engine" or "Service Engine Soon" light on the vehicle's instrument panel).

NOx – Oxides of Nitrogen

O2 – Oxygen

Open Loop – used to describe the fuel mixture when the oxygen sensors are not being used, usually when the engine is cold or if a malfunction preventing closed loop operation is detected. See closed loop.

PCM – Power Control Module

PID – Parameter ID is a number used to designate a particular vehicle sensor.

PTO – Power Take-Off

RPM – Revolutions per Minute

SAE – Society of Automotive Engineers

Scan Tool – a computer that reads out OBD II values from the vehicle.

Service Engine Soon – also known as a MIL light.

SFI – Sequential Fuel Injection

TBI – Throttle Body Injection

TCM – Transmission Control Module

TCS – Traction Control Switch

TFT – Transmission Fluid Temperature

Torque - Torque is a measure of the force acting on an object causing that object to rotate.

TP – Throttle Position

TPS – Throttle Position Sensor

VAC – Vacuum

VIN – Vehicle Identification Number

VSS – Vehicle Speed Sensor

CHAPTER 2

Loading Windows Software

Loading the Nology Laptop-Dyno™ Windows software onto your personal computer is easy. This section shows you how.

Uninstalling Laptop-Dyno™ for Windows

Nology recommends uninstalling all previous versions of the Laptop-Dyno™ for Windows software, if any, before proceeding.

1. From the Start menu, select Settings | Control Panel.
2. Double-click on Add/Remove Programs.
3. Click the Install/Uninstall tab, if your Windows version includes it.
4. From the list of programs that you can remove, select Laptop-Dyno™ for Windows.
5. Click Add/Remove.
6. At the prompt, click Yes to confirm that you want to remove the Laptop-Dyno™ for Windows program.
7. When the files are removed, the uninstall program indicates that the process is complete.

Install Internet Explorer Upgrade

The Laptop-Dyno™ software relies upon Microsoft Internet Explorer version 5.01 or later. The version is located on the Help | About Internet Explorer menu option within Internet Explorer. If you do not have version 5.01 or later, you will need to upgrade using the instructions below.

1. Close all programs.
2. Insert the CD labeled Laptop-Dyno™ for Windows into your CD-ROM drive.
3. From the Start menu, select Run.
4. Type **D:\Internet Explorer\ie6setup** (substitute the appropriate letter of your CD-ROM drive for D).

5. Follow the instructions on the screen.

Alternatively, update your Internet Explorer for free directly from Microsoft at: http://windowsupdate.microsoft.com

Install Laptop-Dyno™ for Windows

1. Close all other programs and windows.

2. Insert the CD labeled Laptop-Dyno™ for Windows into your CD-ROM drive.

3. From the Start menu, select Run.

4. Type **D:\setup** (substitute the appropriate letter of your CD-ROM drive for D). If setup fails to run, the likely cause is not having Internet Explorer 5.01 or higher on the PC (see Install Internet Explorer Upgrade).

5. Follow the instructions on the screen.

By default, the Laptop-Dyno™ for Windows program is installed in C:\Program Files\Nology\Laptop-Dyno™.

Software Updates

Check the Nology website periodically to download software updates at www.nology.com

CHAPTER 3

Connections

Connecting your Nology Laptop-Dyno™ for Windows to the vehicle is easy. This section shows you how.

Connect your Laptop-Dyno™ to the Personal Computer

A Plug the RS-232 cable into the personal computer's serial COM port.

B Connect the RS-232 cable to the OBD II adapter and tighten the two thumbscrews.

C Connect the OBD II cable to the OBD II adapter and tighten the two thumbscrews.

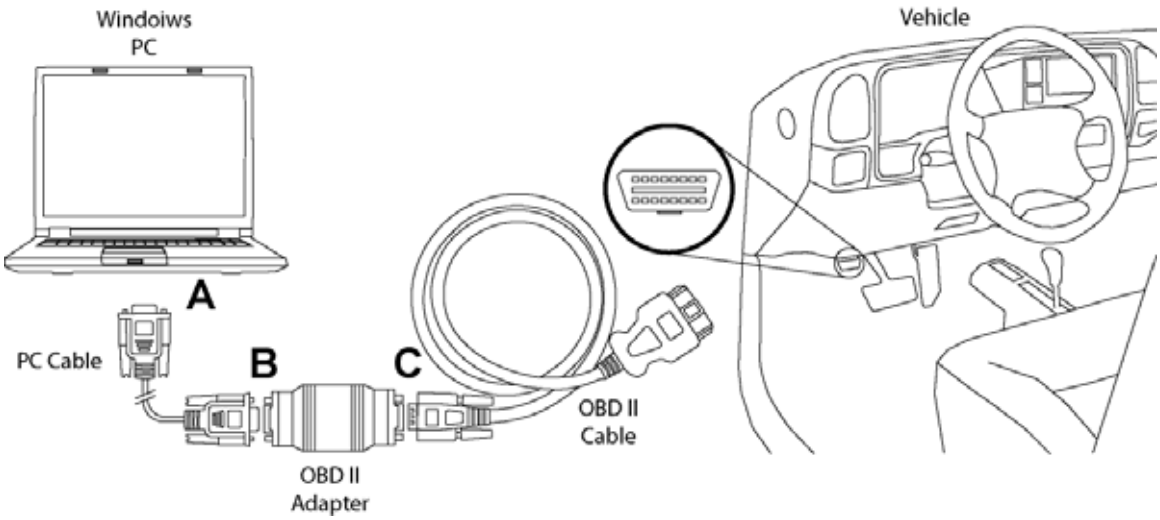


Figure 3: Laptop-Dyno™ Connections

Connect the Laptop-Dyno™ to your Vehicle

Locate the OBD II connector on the vehicle. OBD II compliant vehicles have the 16-pin connector located in plain sight underneath the dash near the driver's seat (see Figure 2). It may also be behind ashtrays.

Connect the male OBD II Cable connector to the vehicle's female OBD II connector. Ensure the connectors are fully engaged.

Select COM Port

1. Start the Laptop-Dyno™ application.

2. Select the Tools | Options... menu selection.

3. On the Options dialog, select the COM port that the scan tool is connected to. The COM port dropdown list only shows COM ports installed on your computer.

4. Press the OK button.

Your Laptop-Dyno™ for Windows is now ready for use.

CHAPTER 4

Scan Tool Operation

The Laptop-Dyno™ software is designed for easy operation. This section shows how to operate the software and describes the features on each screen.

Not every vehicle is equipped with all sensor types supported by the scan tool. Therefore, the scan tool interrogates the vehicle and creates a custom list of sensors and options unique to the vehicle connected.

Ensure the PC, cable, and OBD II adapter do not Interfere with the vehicle controls. A cable dangling in front of the foot pedals, gear shifter, or steering wheel can interferer with vehicle operation and cause a fatal accident. Always ensure the PC, cable, and OBD II adapter are securely fastened out of the way. If the scan tool cannot be safely attached as to not interfere with the vehicle controls, then do not drive the vehicle with the OBD II adapter connected to the vehicle.

Connect Scan Tool to Vehicle

The scan tool must be connected to the vehicle's diagnostic connector, except in demonstration mode where the vehicle data is simulated. See Demo Mode for more information about the demo mode.

1. Turn the vehicle ignition off.

2. Connect the OBD II cable to the vehicle's OBDII connector. Normally the vehicle connector is located under the dash on the driver's side in plain sight.

3. Turn the vehicle's ignition on. Vehicle does not have to be running. For engine running tests, the vehicle can be started and idling.

Do not operate the vehicle indoors. A running engine produces lethal carbon monoxide exhaust fumes that can seriously harm or kill you if inhaled. Only run the vehicle motor outdoors with proper ventilation.

Start Laptop-Dyno™ Software

1. Start the Laptop-Dyno™ software on your personal computer by double-clicking the Laptop-Dyno™ icon.

2. Once the software has started, select the File | Connect menu option.

3. On the Connect dialog, press the "Connect to Vehicle" button to connect to the vehicle. Selecting the Connect to Vehicle Demo checkbox to enable Demo mode see Demo Mode.

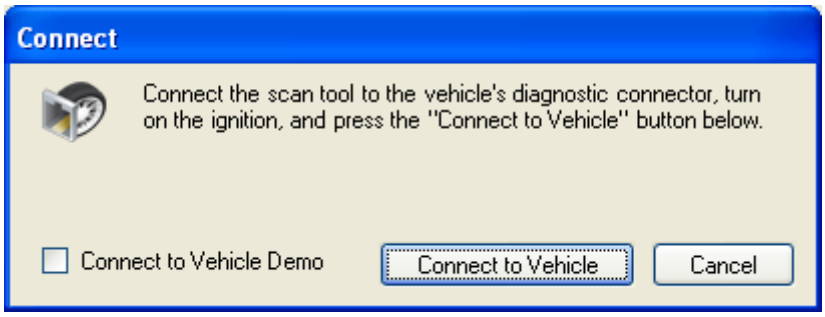

Connect
Connect the scan tool to the vehicle's diagnostic connector, turn on the ignition, and press the "Connect to Vehicle" button below.
Connect to Vehicle Demo
Connect to Vehicle
Cancel

Figure 4: Connect Dialog

4. After a few seconds, the scan tool will detect the vehicle.

Options Dialog

The **Reload last user parameters when starting program** setting, when checked, restores all user parameters to their last known state. Otherwise, the program's default parameters are used.

The **COM Port** setting on the General tab selects the personal computer COM port to use. Make sure the selected COM port matches the one the OBDII's serial cable has been plugged into.

The **Default Units of Measure** setting changes between English or Metric units. Not all sensors use English units of measure, in which case the Metric units are used.

The **Fast Sampling** option on the General tab enables a faster than normal sampling frequency on some vehicles. If you notice on some vehicles that the live sensor monitoring doesn't function or the sensor measurements update sporadically, disable this feature.

With Fast Sampling enabled, the scan tool cannot target a particular vehicle computer module. To obtain live sensor data from a specific computer module, turn Fast Sampling off. For instance, if a vehicle has two computer modules, 16 and 26, and both modules monitor engine RPM. With Fast Sampling enabled, the first module to respond, either 16 or 26, with the RPM data is displayed. With Fast Sampling disabled, the software waits for the exact module selected to respond before displaying the data. This is helpful for targeting measurement problems on a specific computer module.

The Reset Defaults button sets all settings back to their default state.

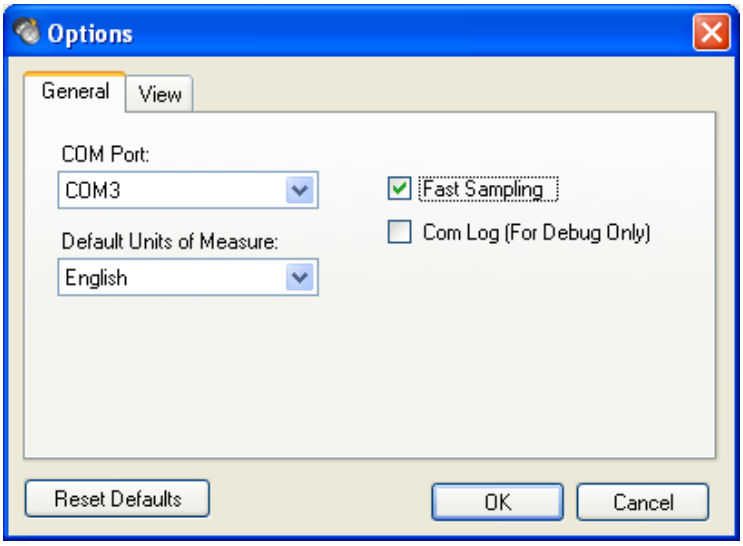


Figure 5: Options Dialog, General Tab

The View tab allows customization of the Font, Font Style, Font Color, and Font Size settings used in all grid displays.

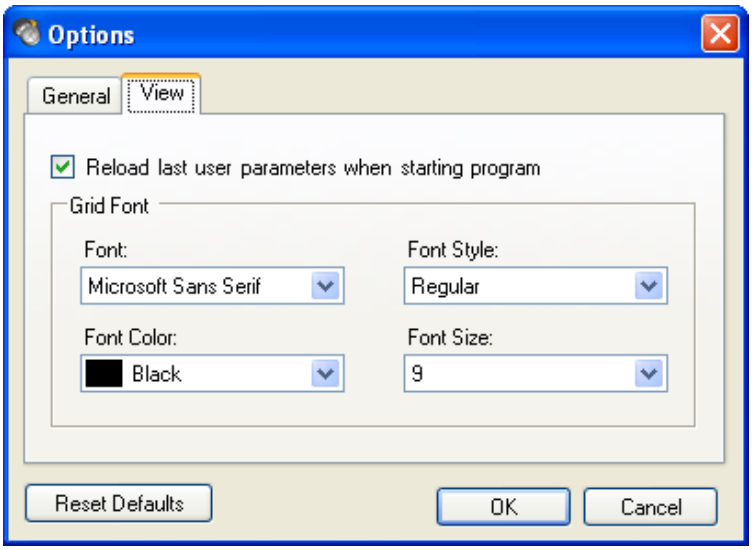


Figure 6: Options Dialog, View Tab

Laptop-Dyno™ File Types

The software uses four data file types with four different file extensions.

Table 2: File Types

File Type	File Extension	Description
Live Data File	.ld	Live data files store live parameter recordings.
Power Torque File	.pt	Stores power torque run data.
Acceleration File	.ac	Stores acceleration run data.
Dyno Setup File	.ds	Stores vehicle and environmental setup information.

Docking Windows

The program contains four docking windows: Navigation, File Properties, Run Statistics, and Dyno Setup Properties. Each docking Windows may be resized, hidden, or slide-in or slide-out from a docked position on demand.

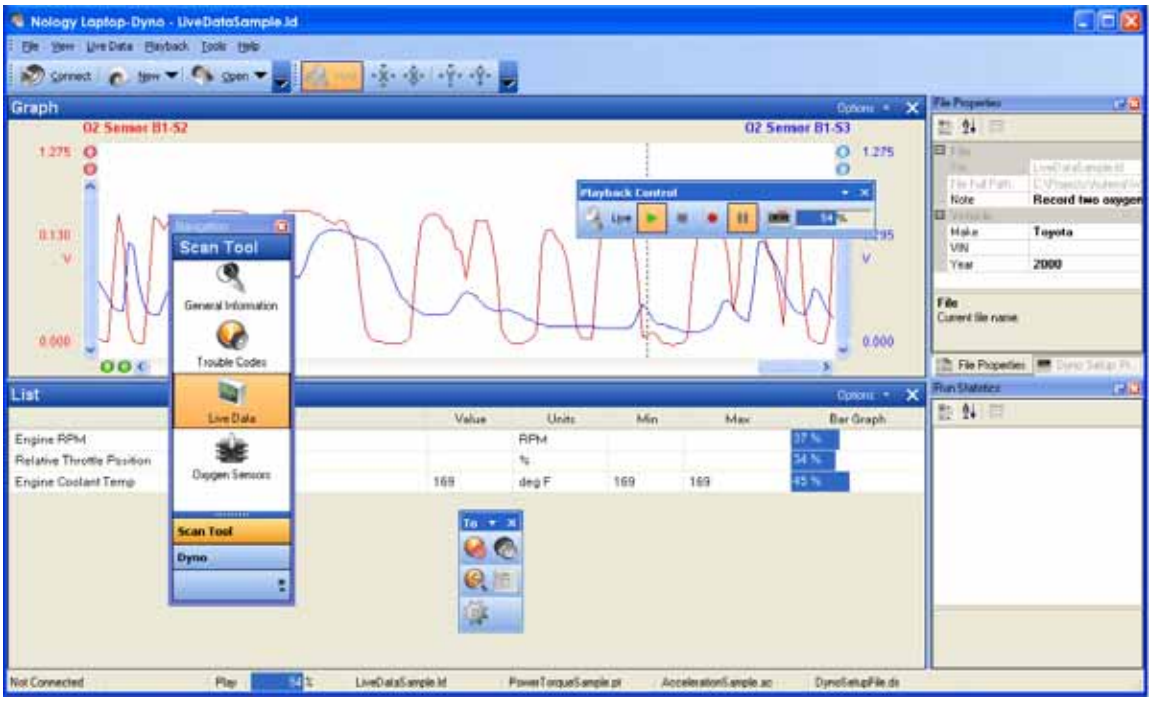


Figure 7: Floating Toolbars and Property Windows

- To hide a docking window, click the red X close button in the upper right corner.
- To hide a docking window with slide-in, press the pushpin icon in the upper right corner. The window will slide in and hide itself.
- To show a hidden docking window, select the View menu option (e.g. View | Navigation).
- To show a docking window with slide-out, hover the mouse button over the docked window name or icon. The window will slide out showing itself.
- If a docking window is not visible, the View menu option will redisplay any of the four windows.
- To move a docking window from dock to float, either drag window title bar to a new location or double click the title bar.
- To move a docking window from float to dock, either drag the window title bar to one of the four window edges (top, bottom, left, right) or double click the title bar.

Properties Windows

Properties values are shown in certain docking windows, such as the Dyno Setup Properties as shown below.

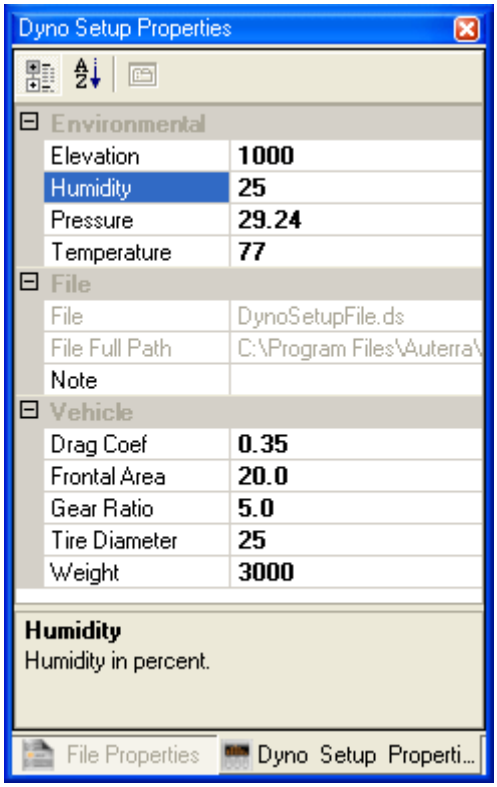


Figure 8: Dyno Setup Properties Docking Window

All property windows share the same behavioral traits, such as:

- Properties displayed in bold font may be modified.
- Properties display in grey font cannot be changed.
- Any property changes are immediately saved to disk.

To change a property value, click the parameter and type in a new value. The change is immediately saved to disk.

Navigation Docking Window

The Navigation docking window is used to switch main screen.

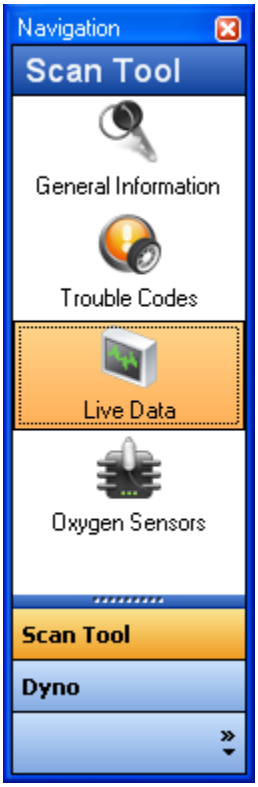


Figure 9: Navigation Docking Window

To switch screens, perform these steps:

1. Click one of main group buttons.
2. Click an item icon from within that group.

For instance, to select the Acceleration screen, select the Dyno group then click the Acceleration icon.

File Properties Docking Window

Live Data, Power Torque, and Acceleration files properties are viewed and changed from the File Properties docking window.

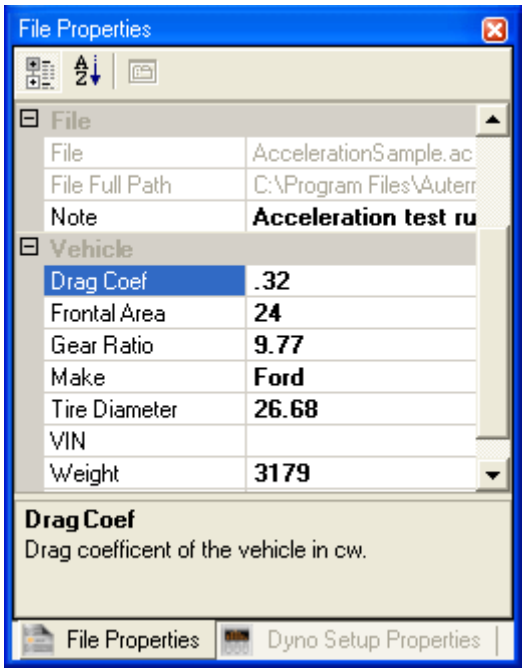


Figure 10: File Properties Docking Window

The File Properties docking window shows different properties depending on the active screen.

Table 3: File Properties Displayed

Active Screen	File Properties Displayed
Live Data	Live Data file
Power Torque	Power Torque file
Acceleration	Acceleration file
All other screens	No properties are displayed

For instance, to view Live Data file properties within the File Properties docking window, select the File | Open | Live Data File... menu option to open a file then switch to the Live Data screen.

Dyno Setup Properties Docking Window

The Dyno Setup file properties are viewed and changed from the Dyno Setup Properties docking window.

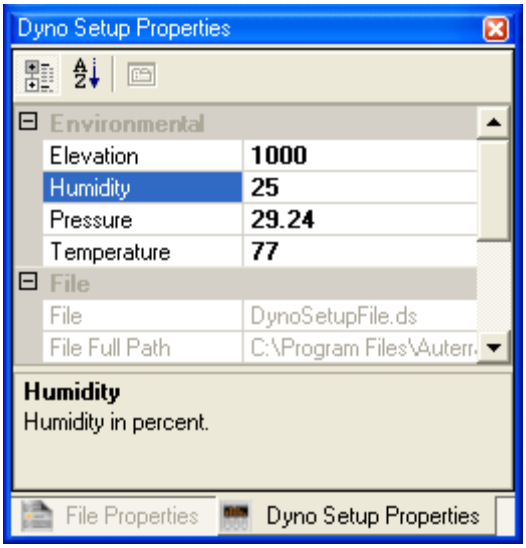


Figure 11: Dyno Setup Properties Docking Window

To view Dyno Setup file within the Dyno Setup Properties docking window, select the File | Open | Dyno Setup File... menu option to open a file.

Run Statistics Docking Window

The Run Statistics docking window shows statistical values for Power Torque and Acceleration curves, such as maximum horsepower or top speed.

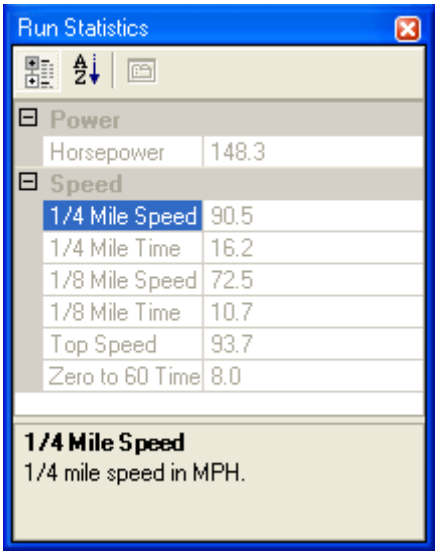


Figure 12: Run Statistics Docking Window

For instance, to view Power Torque statistics within the Run Statistics docking window, select the File | Open | Power Torque File... menu option to open the file then switch to the Power Torque screen.

Toolbars

Toolbar locations, docking position, buttons shown, and sizes are completely user customizable. Each time you start the program; the toolbar settings and position is restored if the "Restore last user parameters when starting program" option is selected (see Options Dialog).

- To move a docked toolbar, left mouse click and drag the vertical dashed line on a toolbar. Alternatively, double click the dashed line to move the toolbar into a floating position.

- To move a floating toolbar, left mouse click the title bar and drag to its new location. Alternatively, double click the title bar to put the toolbar back into its docked position.

- To move toolbar to a new docked location, left mouse click and drag the toolbar to a new edge of the screen. The toolbar can be docked to any of the four application window edges (top, bottom, left, right).

- To customize the buttons shown on the toolbar, click the down arrow located on a docked toolbar to show a toolbar shortcut menu. Alternatively, right mouse click on any blank location within the toolbar area to show the shortcut menu.

- To change to change various toolbar and menu options, such as enable/disable toolbars or change the icons from large to small, select the toolbar shortcut menu then select the Customize… option.

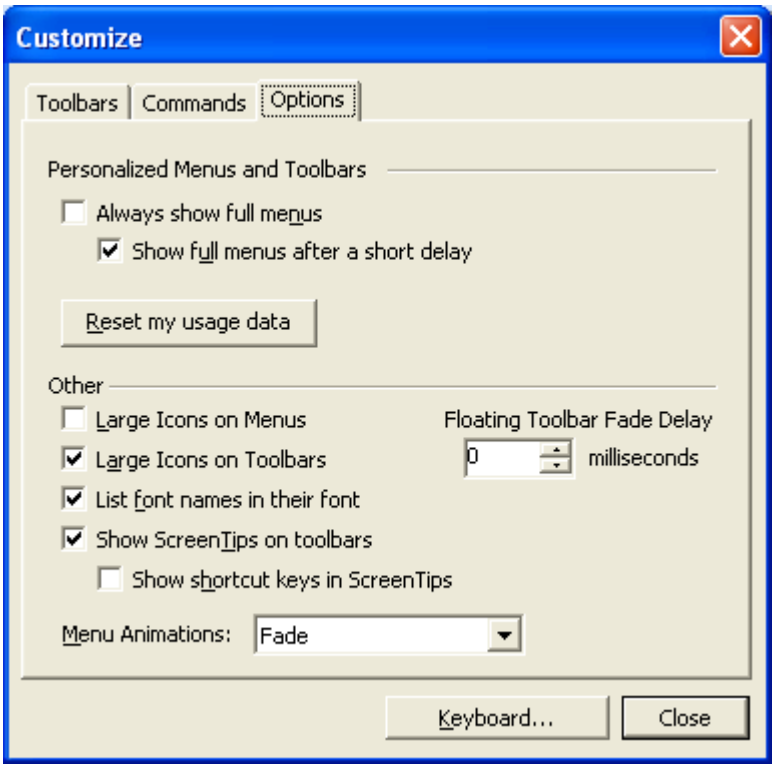


Figure 13: Customize Toolbars and Menus Dialog

Status Bar

The status bar is located at the bottom of the program screen. It displays the following information from left to right:

Vehicle Connection Status – either Connected or Not Connected

Connection Type – the vehicle hardware protocol connection type. For instance, PWM, VPW, CAN, ISO, or KWP.

Data Mode – either Live or Play. Live mode means the data is originating from the vehicle. Play mode means the data is originating or recording to/from a file.

Playback Percentage Bar Graph – the current playback file position as a percent.

Open Live Data File – currently open Live Data file.

Open Power Torque File – currently open Power Torque file.

Open Acceleration File – currently open Acceleration file.

General Information Screen

The General Information screen contains two panes: General Systems and Vehicle Monitor Test Status.

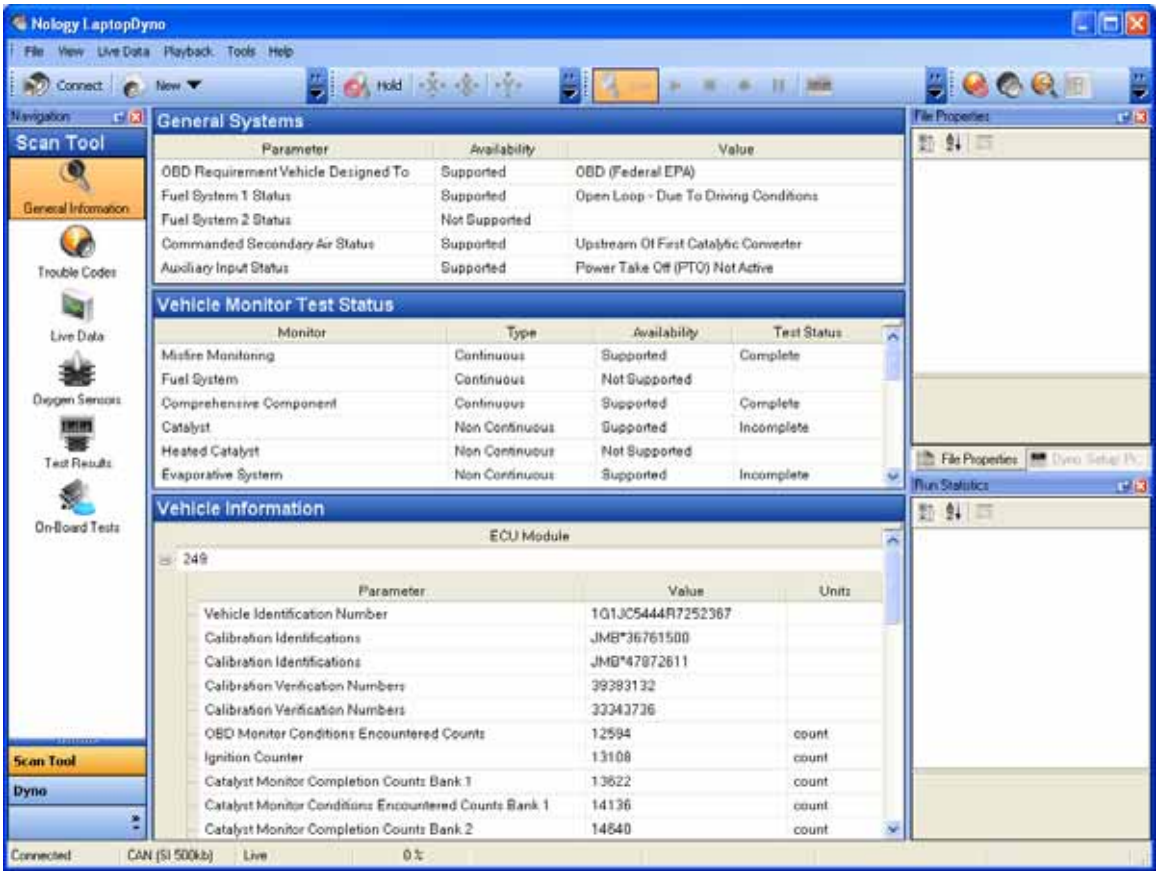

Nology LaptopDyno
File View Live Data Playback Tools Help
Connect New Hold
Navigation
Scan Tool
General Information
Trouble Codes
Live Data
Oxygen Sensors
Test Results
On-Board Tests
Scan Tool
Dyno
General Systems
Parameter Availability Value
OBD Requirement Vehicle Designed To Supported OBD (Federal EPA)
Fuel System 1 Status Supported Open Loop - Due To Driving Conditions
Fuel System 2 Status Not Supported
Commanded Secondary Air Status Supported Upstream Of First Catalytic Converter
Auxiliary Input Status Supported Power Take Off (PTO) Not Active
Vehicle Monitor Test Status
Monitor Type Availability Test Status
Misfire Monitoring Continuous Supported Complete
Fuel System Continuous Not Supported
Comprehensive Component Continuous Supported Complete
Catalyst Non Continuous Supported Incomplete
Heated Catalyst Non Continuous Not Supported
Evaporative System Non Continuous Supported Incomplete
Vehicle Information
ECU Module
249
Parameter Value Units
Vehicle Identification Number 1G1JC5444R7252367
Calibration Identifications JMB*36761500
Calibration Identifications JMB*47872611
Calibration Verification Numbers 39383132
Calibration Verification Numbers 33343736
OBD Monitor Conditions Encountered Counts 12594 count
Ignition Counter 13108 count
Catalyst Monitor Completion Counts Bank 1 13622 count
Catalyst Monitor Conditions Encountered Counts Bank 1 14136 count
Catalyst Monitor Completion Counts Bank 2 14640 count
File Properties
Run Statistics
Connected CAN (SI 500kb) Live 0 %

Figure 14: General Systems Screen

The General Systems pane shows general information about the vehicle test systems. The system availability of each parameter is either Supported or Not Supported. If the parameter is supported, then the Value column shows the status of the parameter.

The Vehicle Monitor Test Status pane shows the status of the vehicle's built-in readiness monitor tests. Two monitor types exist: Continuous and Non-Continuous. The test status is either Complete or Incomplete.

The Vehicle Information pane shows vehicle specific information such as Vehicle Identification Number (VIN), Calibration IDs and Performance Tracking counters.

The software continually queries the vehicle to display the current status of values on the General Systems and Vehicle Monitor Test Status panes.

Diagnostic Trouble Codes Screen

The Diagnostic Trouble Codes screen has three panes: Stored Diagnostic Trouble Codes, Pending Diagnostic Trouble Codes, and Freeze Frame.

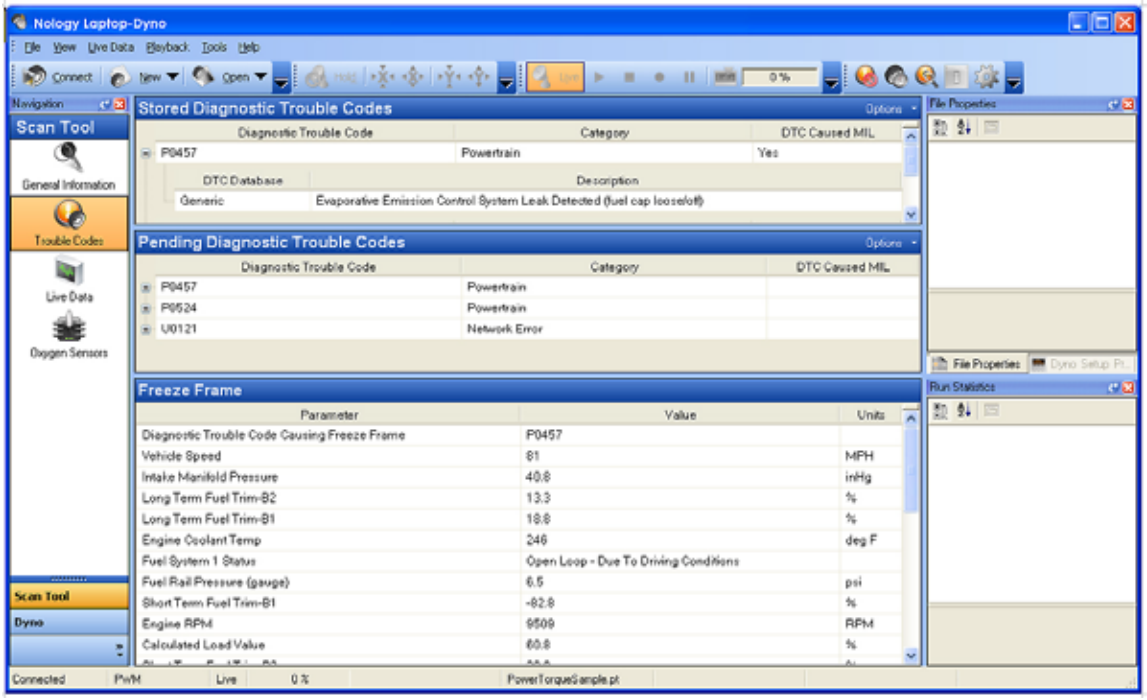


Figure 15: Trouble Codes Screen

Stored and Pending Diagnostic Trouble Codes Pane

The Stored and Pending Diagnostic Trouble Codes panes display the vehicle's pending and stored Diagnostic Trouble Codes (DTC), if any. The Diagnostic Trouble Codes screen continually scans for new DTCs, even if some DTCs are already shown.

All DTCs are displayed within 10 to 20 seconds. If the vehicle's Check Engine or Service Engine Soon light on the instrument panel is illuminated, a stored DTC will be displayed. Pending DTCs do not necessarily indicate a faulty component/system. If the vehicle's test results indicate a failure after additional driving, then the Check Engine light is illuminated and a DTC is set in the stored DTC pane.

Two categories of trouble codes exist: generic and enhanced. Generic codes are standardized and common to all vehicle manufacturers. Enhanced codes are not uniquely defined and may overlap with another manufacture, or even the same manufacturer. For instance, multiple definitions may exist for code P1234. Ford may define it as "Engine Oil Pressure Too Low", but Toyota's definition could mean something different like "System Voltage Unstable". The Diagnostic Trouble Codes screen reads and clears both generic and enhanced codes.

There are four types of trouble codes: P (Powertrain), B (Body), C (Chassis), and U (Network Communication). The scan tool reads and clears all P-codes and, depending on the vehicle, B, C, and U-codes as well[2].

1. Switch to the Diagnostic Trouble Codes screen as described in the section Navigation Docking Window.

2. If the vehicle has detected a Diagnostic Trouble Code(s) (DTC) they are listed in either the Stored or Pending Diagnostic Trouble Codes pane. Not all Diagnostic Trouble Codes cause the MIL light (i.e. Check Engine) to illuminate.

3. If the MIL light is on (Check Engine), the Diagnostic Trouble Code that caused the light to illuminate is marked with a Yes in the "DTC Caused MIL" column. The Freeze Frame pane will contain a snapshot of a variety of sensor values at the time the error occurred (see Freeze Frame). Useful for diagnosing operating parameters of the vehicle at the time the MIL occured.

4. If you wish to clear the MIL, select the Tools | Clear DTCs... menu option to clear all DTCs from the vehicle's memory. Wait a few seconds after pressing Yes on the Clear Trouble Codes dialog for the scan tool to complete the clear command.

5. Pressing Yes will clear the DTC from vehicle memory. Once cleared, the error codes cannot be recovered. Clearing also extinguishes the vehicle's MIL (i.e. Check Engine) light and erases the vehicle's freeze frame log. Sometimes the vehicle's ignition must be turned off and on again before the Check Engine light turns off.

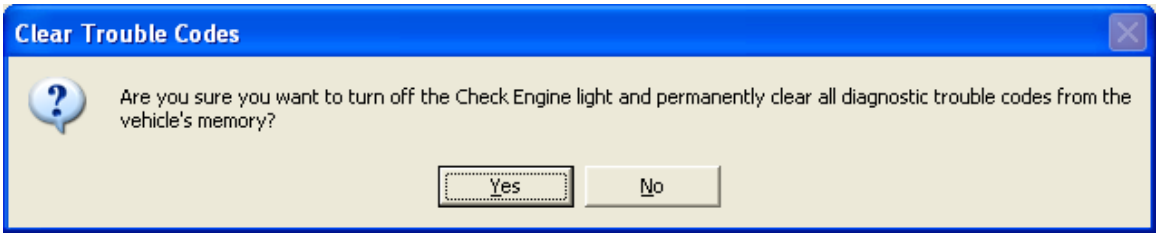

Clear Trouble Codes
Are you sure you want to turn off the Check Engine light and permanently clear all diagnostic trouble codes from the vehicle's memory?
Yes
No

Figure 16: Clear Trouble Codes

6. Tapping the '+' icon next a trouble code number will expand out the possible DTC textual descriptions. The software may not contain a description for every possible trouble code. If the software cannot find a description, please refer to your vehicle's repair manual. See Diagnostic Trouble Codes for more information.

Freeze Frame Pane

The Freeze Frame pane displays the vehicle freeze frame log. Select the sensor units of measure, either English or Metric, using the Preferences screen (see Options Dialog). When a Diagnostic Trouble Code occurs that illuminates the Check Engine light, the

[2] Not all vehicles support retrieving and clearing B, C, and U-codes.

vehicle's computer saves the current values of the vehicle's sensors at the instant the error occurred. If a freeze frame exists, it will display within a few seconds. Each vehicle supports a different complement of sensors. The Freeze Frame pane displays only sensors appropriate for the vehicle under test. This pane remains blank if no freeze frame information is available from the vehicle.

Record/Playback

The Live Data screen can record and playback live sensor data. The recording and playback is controlled from the Playback menu option.

The Record/Playback settings are:

Live – display live data as it is occurring.

Play – playback a previously recorded file.

Stop – stop a playing file.

Record – start recording live data.

Pause – pause a file during playback.

The Live Data panes have two modes of operation: Live and Play. When the Playback control is set to Live, all displayed parameters are live from the vehicle. If the Playback control is set to Play, Pause, Stop, or Record the scan tool is in the Play mode (see Status Bar).

The recorded data is saved in a Live Data file. The Live Data files are open and created from the File | New and File | Open menu options.

Once a file is open, selecting Record saves the data into the currently opened file. Similarly, Play plays back the currently opened file.

New vehicle parameters are selected while in Live mode. Once the mode has switched to Play mode, new parameters cannot be added; always switch to Live mode to add/remove parameters via the Parameter Edit dialog.

The playback speed does not use the same time-base as the original recording. Therefore, playback will be faster than when recorded. This makes it easier to review long recorded files.

Playback position is controlled using the Playback | Set Playback Position control. 0% is the beginning of the file and 100% is the end.

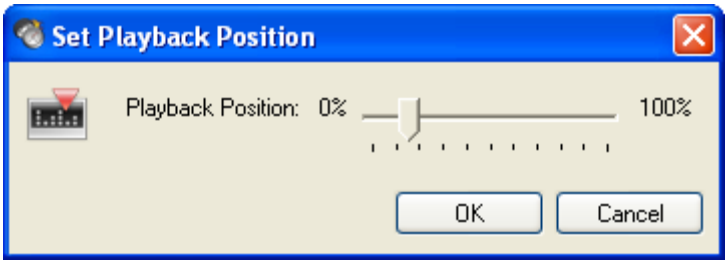


Figure 17: Set Playback Position Dialog

A Live Data file saves a list of parameters recorded. The Parameter Edit dialog shows recorded parameters in the Parameter list box and the word "Play" is displayed as the Module. The Sample Speed control is hidden when in play mode. See Parameter Edit Dialog for more information.

A typical Live Data record session proceeds as follows:

1. Switch to the Live Data screen as described in the section Navigation Docking Window.
2. Ensure the Playback mode is set to Live by selecting the Playback | Live menu option.
3. Create a new Live Data file by selecting File | New | Live Data File...
4. Enter a file name, and press Open.
5. Press the Options label in the upper right corner of the Graph pane. Alternatively, right mouse click anywhere in the Graph pane. Select the Edit Parameters menu option.
6. Press the Add Parameter button.
7. Select a sensor from the ECU Parameter box located on the right side of the dialog.
8. Press OK.
9. Set the Playback mode on the Playback | Record menu to start recording.
10. Select the Playback | Stop menu option after a few seconds of recording.
11. Select the Playback | Play menu option to playback the previously recorded file.

Parameter Edit Dialog

The Parameter Edit dialog selects a parameter to monitor, record, or playback.

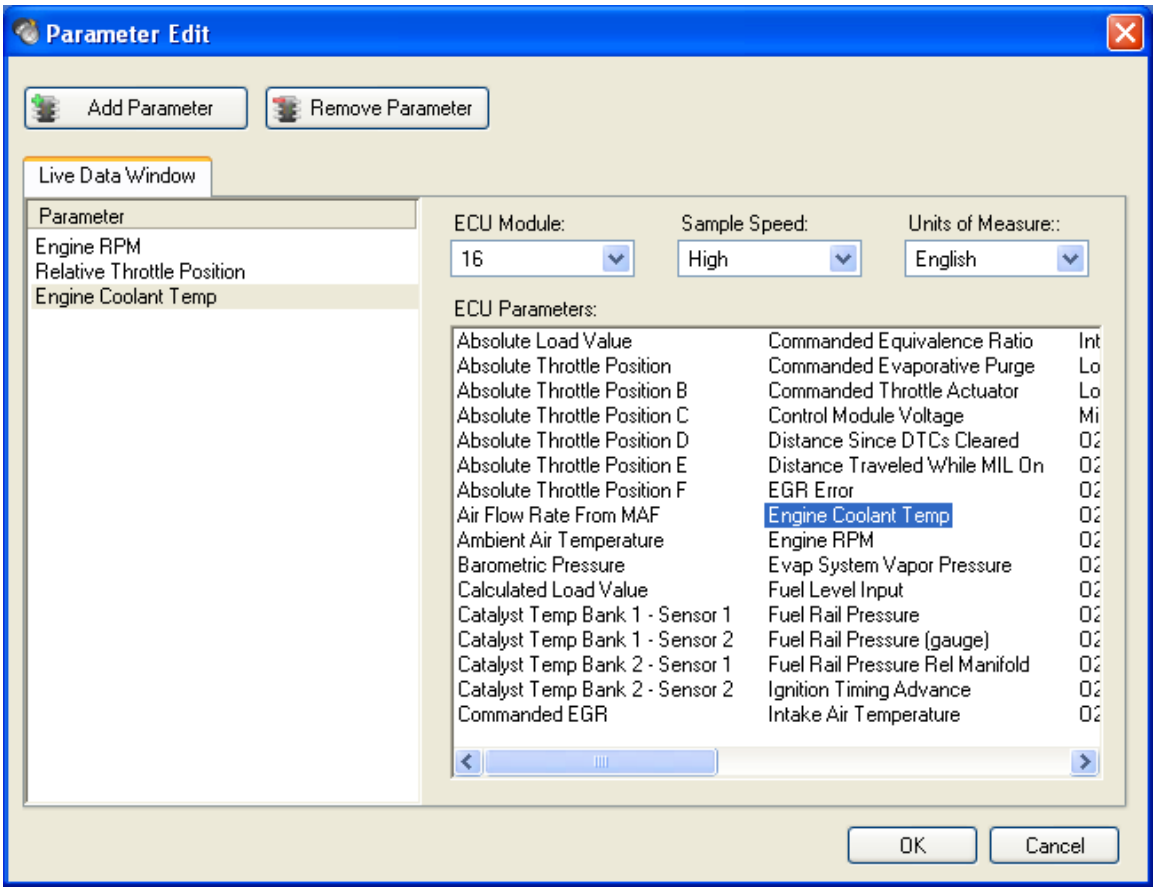


Figure 18: Parameter Edit Dialog

Not every vehicle is equipped will all sensor types and not every vehicle supports every parameter type. Therefore, the software interrogates the vehicle and creates a custom, alphabetical listing of the parameters unique to the vehicle and module selected.

Some vehicles are equipped with multiple computer modules. When switching between modules using the ECU Module control, the ECU Parameter list box refreshes showing only parameters supported by the selected ECU module.

ECU Module – selects a vehicle computer module. Some vehicles have more than one computer module. See Options Dialog for information on how the Fast Sampling setting affects data returned from a module.

Sample Speed – selects the sampling speed for the sensor. High samples at up to 40mS[3], Med is about 3 seconds, and Low is about every 10 seconds per sample.

[3] Actual sampling speed is vehicle dependant.

Units of Measure – selects the units of measure for the sensor reading, either English or Metric.

ECU Parameters – selects the vehicle parameter to monitor. The list of sensors is dynamically created depending on the types of sensors supported by the vehicle. If the vehicle has more than one computer module, when the Module setting is changed the Parameter list is updated to reflect the sensors supported by that module.

Add and Remove Parameters

To add a Parameter, follow these steps:

1. Switch to the Live Data screen as described in the section Navigation Docking Window.
2. Press the Options button in the upper right corner of the Graph pane. Alternatively, right mouse click anywhere in the Graph pane. Select the Edit Parameters menu option.
3. Press Add Parameter.
4. Select the ECU Module to monitor.
5. Select the Sampling Speed desired.
6. Select the Units of Measure to display.
7. Select the parameter to monitor within the ECU Parameters list box.
8. Repeat the above process to add more parameters.
9. Press OK.

To remove a Parameter, follow these steps:

1. Select the parameter to remove in the Parameter list.
2. Press the Remove Parameter button.
3. Repeat the above process to remove more parameters.
4. Press OK.

Supported Parameters

The following is a list of all the live parameters supported by the software and a brief description of each parameter. Other non-live parameters, such as statuses or test results, are not listed here.

Air Flow Rate From MAF – indicates the airflow rate as measured by the mass air flow sensor.

Absolute Throttle Position – the absolute throttle position (not the relative or learned) throttle position. Usually above 0% at idle and less than 100% at full throttle.

Calculated Load Value – indicates a percentage of peak available torque. Reaches 100% at wide open throttle at any altitude or RPM for both naturally aspirated and boosted engines.

Engine Coolant Temp – engine coolant temperature derived from an engine coolant temperature sensor or a cylinder head temperature sensor.

Engine RPM – displays the current engine revolutions per minute value.

Fuel Rail Pressure (gauge) – displays the fuel injection rail pressure at the engine when the reading is referenced to atmosphere (gauge pressure).

Ignition Timing Advance – ignition timing advance for #1 cylinder (not including any mechanical advance).

Intake Manifold Pressure – indicates the manifold pressure derived from a Manifold Absolute Pressure sensor.

Long Term Fuel Trim-BX (up to 2) – indicates the correction being used by the fuel control system in both open and closed loop modes of operation.

O2 Sensor BX-SX (up to 8) – indicates the voltage for conventional 0 to 1V oxygen sensors. O2 sensors with a different full-scale voltage shall be normalized to this range or, if a wide range sensor, may use the wide range parameters instead.

Short Term Fuel Trim-BX (up to 2) – indicates the correction being used by the closed loop fuel algorithm. If the fuel system is open loop, 0% correction should be reported.

Time Since Engine Start – shall increment the time since the engine was started while the engine is running.

Vehicle Speed – displays the vehicle road speed.

Absolute Load Value – is the normalized value of air mass per intake stroke displayed as a percent.

Absolute Throttle Position (up to 3) – the absolute throttle position (not the relative or learned) throttle position. Usually above 0% at idle and less than 100% at full throttle.

Accelerator Pedal Position (up to 3) - the absolute pedal position (not the relative or learned) pedal position. Usually above 0% at idle and less than 100% at full throttle.

Ambient Air Temperature – displays the ambient air temperature.

Barometric Pressure – barometric pressure normally obtained from a dedicated barometric sensor. Note some weather services report barometric pressure adjusted to sea level. In these cases, the reported value may not match the displayed value.

Catalyst Temp Bank X – Sensor X (up to 4) – displays the catalyst substrate temperature.

Commanded EGR – display 0% when the EGR is commanded off, 100% when the EGR system is commanded on, and if the EGR is duty cycled somewhere between 0% and 100%.

Commanded Equivalence Ratio – fuel systems that use conventional oxygen sensors display the commanded open loop equivalence ratio while the system is in open loop. Should report 100% when in closed loop fuel. To obtain the actual air/fuel ratio being commanded, multiply the stoichiometric A/F ratio by the equivalence ratio. For example, gasoline, stoichiometric is 14.64:1 ratio. If the fuel control system was command an equivalence ratio of 0.95, the commanded A/F ratio to the engine would be 14.64 * 0.95 = 13.9 A/F.

Commanded Evaporative Purge – displays 0% when no purge is commanded and 100% at the maximum commanded purge position/flow.

Commanded Throttle Actuator – displays 0% when the throttle is commanded closed and 100% when the throttle commanded open.

Control Module Voltage – power input to the control module. Normally the battery voltage, less any voltage drop between the battery and the control module.

Distance Since DTCs Cleared – distance accumulated since DTCs where cleared with a scan tool.

Distance Traveled While MIL On – accumulates the vehicle distance traveled while the MIL light is illuminated.

EGR Error – error as percent of actual commanded EGR. Negative percent is less than commanded and positive is more than commanded.

Evap System Vapor Pressure – evaporative system vapor pressure normally obtained from a sensor located in the fuel tank.

Fuel Level Input – indicates the nominal fuel tank liquid fill capacity as a percent of maximum.

Fuel Rail Pressure – indicates the fuel rail pressure at the engine referenced to atmosphere (gauge pressure).

Fuel Rail Pressure Rel Manifold – displays the fuel rail pressure referenced to the manifold vacuum (relative pressure).

Intake Air Temperature – displays the intake manifold air temperature.

Minutes Run with MIL On – accumulated minutes of engine run time while the MIL light is on.

O2 Sensor BX-SX Wide Range mA (up to 8) – shows milliamps for linear or wide-ratio oxygen sensors.

O2 Sensor BX-SX Wide Range V (up to 8) – shows voltage for linear or wide-ratio oxygen sensors.

Relative Throttle Position – relative or "learned" throttle position.

Time Since DTCs Cleared – accumulated time since DTCs where cleared with a scan tool.

Warm-ups Since DTCs Cleared – number of warm-up cycles since all DTCs were cleared via a scan tool. A warm-up is defined as the coolant temperature rising by at least 22°C (40°F) and the engine temperature reaches at a minimum 70°C (160°F) (60°C (140°F) for diesels).

Live Data Screen

The Live Data screen has two panes: List and Graph.

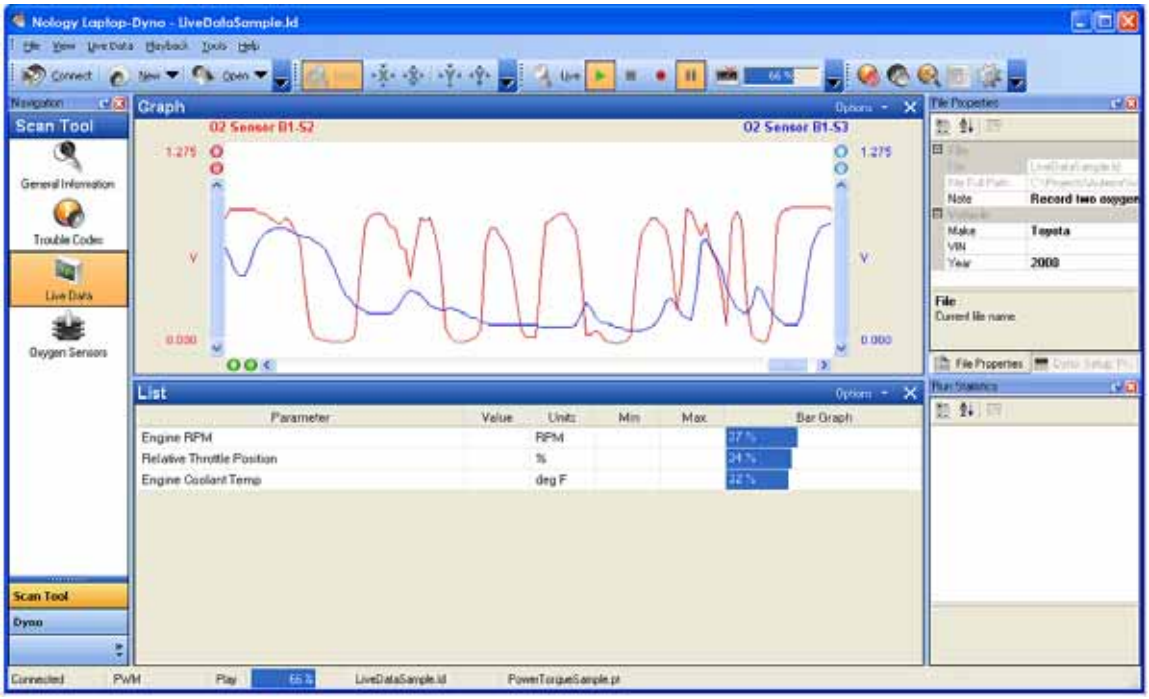


Figure 19: Live Data Screen

The Live Data screen supports recording and playback of live data. See Record/Playback for more information.

The Options button in the upper right corner of each pane provides a menu of options. Alternatively, right mouse clicking inside any pane displays the Options menu.

Panes are added or deleted using the Options menu items Add Graph Pane, Add List Pane, and Delete Pane.

List Pane

The List pane displays real-time sensor readings from the vehicle in a list format. Any number of sensors can be monitored simultaneously. Note the more sensors selected, the slower the update interval of each sensor.

1. Switch to the Live Data screen as described in the section Navigation Docking Window.

2. Press the Options button in the upper right corner of the List pane. Alternatively, right mouse click anywhere in the List pane. Select the Edit Parameters menu option.

3. Press the Add Parameter button.

4. Select a sensor from the ECU Parameters list box located on the right side of the dialog.

5. Press OK.

6. Live data now displays in the List pane.

7. Selecting Live Data | Hold temporarily suspends updating the Live data display. Selecting Hold again resumes sensor sampling.

The List pane shows these values:

Parameter – the selected parameter.

Value – the last measured parameter reading.

Units – the units of measurement for the Value.

Min – the minimum Value measured.

Max – the maximum Value measured.

Bar Graph – the current Value reading in relation to the absolute minimum and maximum parameter values.

To reset the Min and Max values, select Options | Reset Min Max.

Graph Pane

The Graph pane displays real-time sensor readings from the vehicle in a line graph format. Two sensors at a time may be monitored simultaneously on one Graph pane. More panes are added using the Options | Add Graph Pane option.

The Live Data menu options Zoom in X, Zoom in Y, Zoom out X, and Zoom out Y zoom the graph - vertically and horizontally. Each trace can be zoomed on the vertical axis independent of the other trace by using the zoom in/out buttons next to the scroll bars. The horizontal axis zooms both traces together.

When changing vertical zoom levels, the minimum and maximum display value labels change to reflect the new range. The current sensor reading will always display the correct value irrespective of the zoom range or graphical clipping.

Data values exceeding the vertical graph limits, either high or low, will be clipped at the vertical maximum/minimum graph value.

The graph control has a virtual trace buffer that stores many pages of graph information. Scroll right and left using the control a the bottom of the graph pane to view all the data within the trace buffer.

Exact measurement values for any data point along the trace can be shown using the marker. The marker is a vertical dashed line within the graphing area. A left mouse click within the graph boundaries sets the marker position. The data point under the marker for each axis will update as the marker is moved about the graphing area.

Pressing zoom in will center the horizontal axis display around the marker. This facilitates selecting a point of interest with the marker, then zooming in the horizontal axis to examine the data point.

The sensor Sample Speed (High, Medium, or Low) for each trace must be the same on the Graph screen. The software enforces identical sample speeds.

1. Switch to the Live Data screen as described in the section Navigation Docking Window.

2. Press the Options button in the upper right corner of the Graph pane. Alternatively, right mouse click anywhere in the List pane. Select the Edit Parameters menu option.

3. Press the Add Parameter button.

4. Select a sensor from the ECU Parameters list box located on the right side of the dialog.

5. Press OK.

6. Live data now displays on the Graph pane.

7. Selecting Live Data | Hold temporarily suspends the Live display. Selecting Hold again resumes sensor sampling.

Oxygen Sensors

The Oxygen Sensors screen has two panes: Oxygen Sensor Test Results and Oxygen Sensor Output Legend.

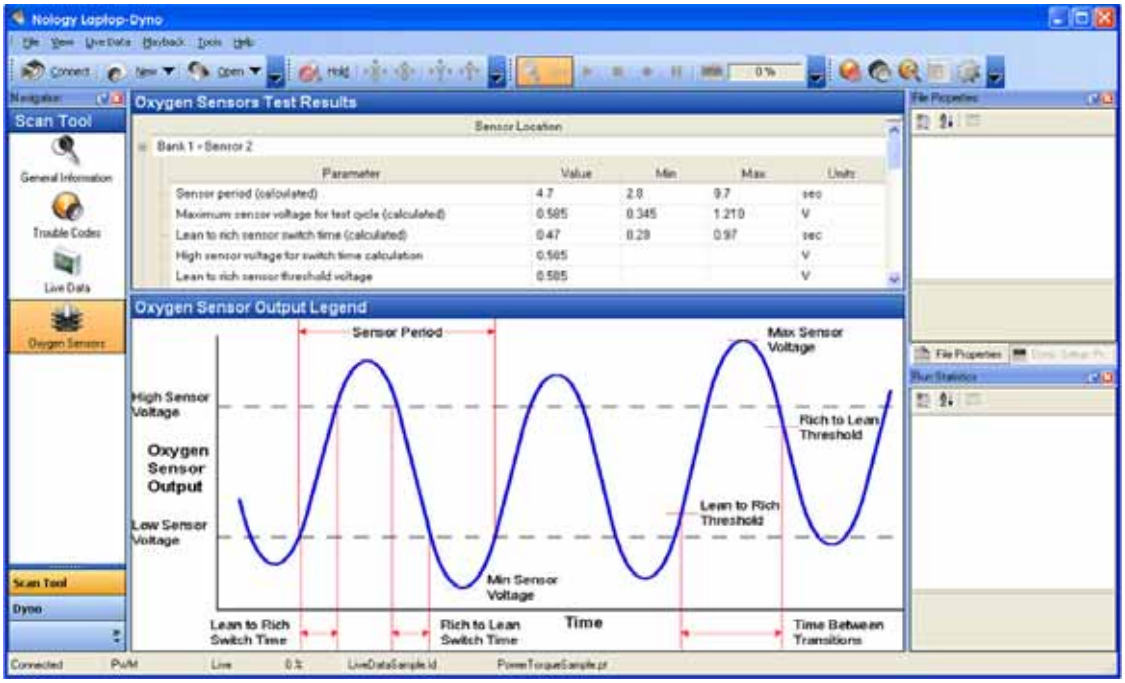


Figure 20: Oxygen Sensors Screen

Oxygen Sensors Test Results Pane

The Oxygen Sensors Test Results pane displays the vehicle's oxygen sensor test results. The results displayed here are computed/measured by the vehicle's on-board computer (ECU) last successful test. These tests are performed internally by the vehicle and are not initiated by the scan tool. These are not live values but instead the results of the ECU's last O2 sensor test. For live O2 sensor readings, refer to any of the live sensor screens such as Graph Pane, selecting the desired O2 sensor parameters

For these test results to accurate, the Oxygen Sensor test on the in the Vehicle Monitor Status section within the Vehicle Monitor Test Status pane should have a Test Status of Complete.

Not all test values are applicable to all vehicles. Therefore, the list generated will vary depending on the vehicle. In addition, not all vehicles support the Oxygen Sensors screen. If the vehicle or a particular sensor does not support this feature, the screen list will be blank.

The test values measured by the ECU correspond to certain attributes of the O2 sensor voltage over time waveform as shown the Oxygen Sensor Output Legend Pane.

1. Switch to the Oxygen Sensors screen as described in the section Navigation Docking Window.

2. Press the "+" icon next to the Sensor Location to display the sensor results.

The Oxygen Sensors Test Results displays these values:

Parameter – an oxygen sensor parameter.

Value – the ECU measured test result

Min - the minimum test limit for which the measured test result is compared.

Max - the maximum test limit for which the measured test result is compared.

Units – the units of measure for the Value.

Oxygen Sensor Output Legend Pane

The Oxygen Sensor Output Legend Pane shows an oxygen sensor voltage over time waveform illustration. Each parameter with in the Oxygen Sensors Test Results pane is measured is shown on the illustration.

Test Results Screen

The Test Results screen shows the results for on-board diagnostic monitoring test of specific components / systems that are continuously monitored (e.g. mis-fire monitoring) and non-continuously monitored (e.g. catalyst system).

The Test Results pane displays the vehicle ECU's test results. The results displayed here are computed/measured by the vehicle's on-board computer (ECU) last successful test. These tests are performed internally by the vehicle and are not initiated by the scan tool. These are not live values but instead the results of the ECU's last test.

Not all test values are applicable to all vehicles. Therefore, the list generated will vary depending on the vehicle. In addition, only vehicles using CAN communication protocol are supported on this screen. If the vehicle or a particular sensor does not support this feature, the screen list will be blank.

The Test Results displays these values:

Parameter – a test result parameter.

Value – the ECU measured test result

Min - the minimum test limit for which the measured test result is compared.

Max - the maximum test limit for which the measured test result is compared.

Units – the units of measure for the Value.

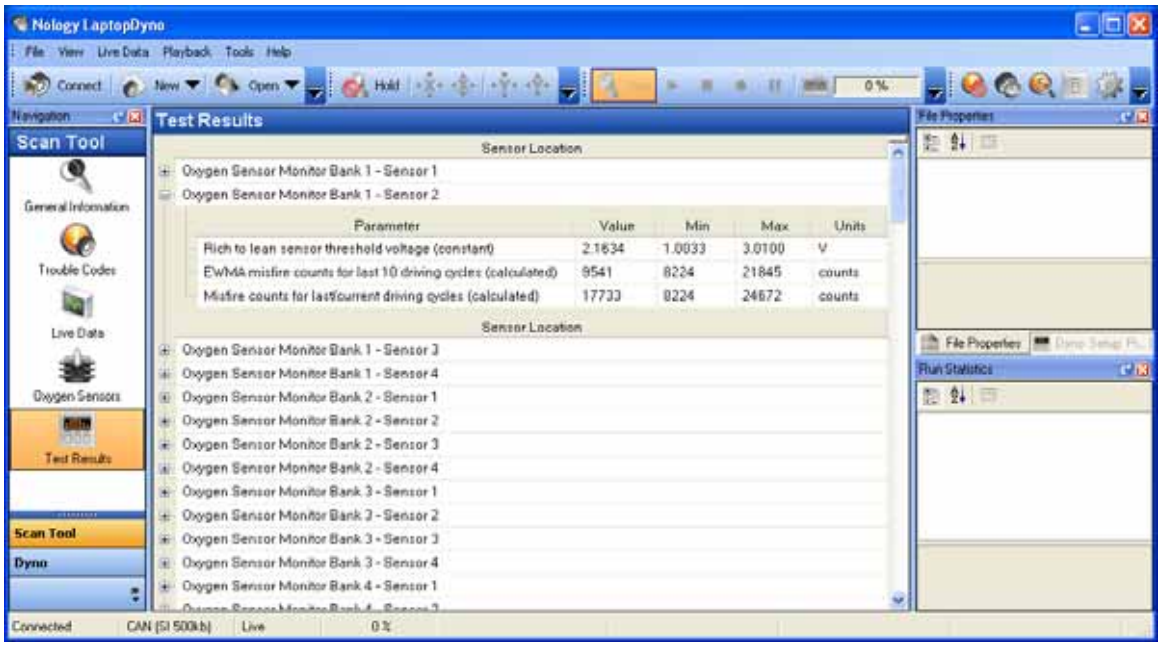

Nology LaptopDyno
File View Live Data Playback Tools Help
Connect New Open Hold
Navigation
Scan Tool
General Information
Trouble Codes
Live Data
Oxygen Sensors
Test Results
Scan Tool
Dyno
Test Results
Sensor Location
Oxygen Sensor Monitor Bank 1 - Sensor 1
Oxygen Sensor Monitor Bank 1 - Sensor 2
Parameter Value Min Max Units
Rich to lean sensor threshold voltage (constant) 2.1634 1.0033 3.0100 V
EWMA misfire counts for last 10 driving cycles (calculated) 9541 8224 21845 counts
Misfire counts for last/current driving cycles (calculated) 17733 8224 24672 counts
Sensor Location
Oxygen Sensor Monitor Bank 1 - Sensor 3
Oxygen Sensor Monitor Bank 1 - Sensor 4
Oxygen Sensor Monitor Bank 2 - Sensor 1
Oxygen Sensor Monitor Bank 2 - Sensor 2
Oxygen Sensor Monitor Bank 2 - Sensor 3
Oxygen Sensor Monitor Bank 2 - Sensor 4
Oxygen Sensor Monitor Bank 3 - Sensor 1
Oxygen Sensor Monitor Bank 3 - Sensor 2
Oxygen Sensor Monitor Bank 3 - Sensor 3
Oxygen Sensor Monitor Bank 3 - Sensor 4
Oxygen Sensor Monitor Bank 4 - Sensor 1
File Properties
Run Statistics
Connected
Live

Figure 21: Test Results Screen

On-Board Tests Screen

The On-Board Tests screen shows the bi-directional controls supported by the vehicle. Bi-directional on-board tests are commands sent by the scan tool to the vehicle to perform some action.

The Bi-Directional Control pane shows the tests supported by the vehicle. If the vehicle does not support any bi-directional controls, the screen will remain blank. To run an on-board test, select the test to run then press the Run Selected On-Board Test. The vehicle will respond to the command with a status shown in the Status column.

Table 4: Status Messages

Status	Meaning
Complete	Indicates the vehicle completed the requested action successfully.
General Reject	Indicates that the service requested was rejected but the vehicle ECU did not specify the reason of the rejection.
Service Not Supported	Indicates that the requested action will not be taken because the vehicle ECU does not support the requested service.
Sub Function Not Supported – Invalid Format	Indicates that the requested action will not be taken because the vehicle ECU does not support the arguments of the requested message.
Busy – Repeat Request	Indicates the vehicle ECU is temporarily too busy to perform he requested operation.

Conditions Not Correct Or Request Sequence Error	Indicates that the requested action will not be taken because the vehicle ECU prerequisite conditions are not met. May also occur when sequence sensitive requests are issued in the wrong order.

The Bi-Directional Test Description pane provides a description for the currently selected bi-directional control within the Bi-Directional Control pane.

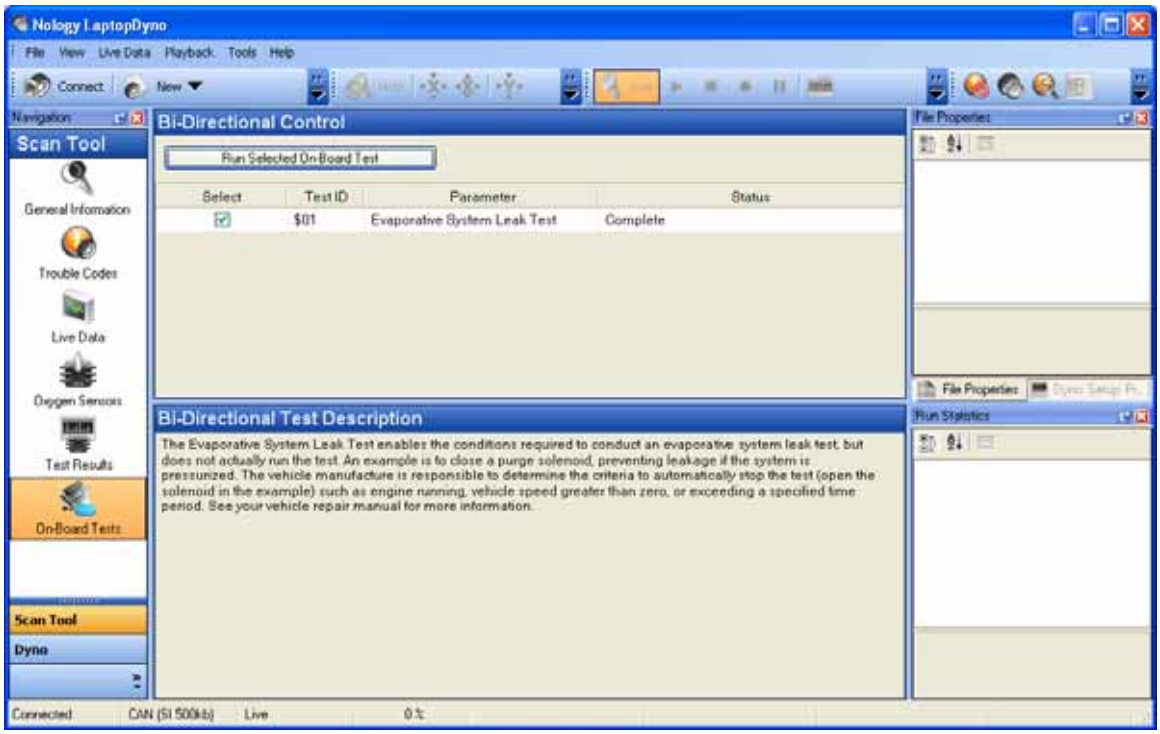

Nology LaptopDyno
File View Live Data Playback Tools Help
Connect New
Navigation
Scan Tool
General Information
Trouble Codes
Live Data
Oxygen Sensors
Test Results
On-Board Tests
Scan Tool
Dyno
Bi-Directional Control
Run Selected On-Board Test
Select
Test ID
Parameter
Status
$01
Evaporative System Leak Test
Complete
Bi-Directional Test Description
The Evaporative System Leak Test enables the conditions required to conduct an evaporative system leak test, but does not actually run the test. An example is to close a purge solenoid, preventing leakage if the system is pressurized. The vehicle manufacture is responsible to determine the criteria to automatically stop the test (open the solenoid in the example) such as engine running, vehicle speed greater than zero, or exceeding a specified time period. See your vehicle repair manual for more information.
File Properties
Run Statistics
Connected
CAN (SI 500kb)
Live
0 %

Figure 22: On-Board Tests Screen

Code Search Screen

The Code Search dialog provides an interactive search of diagnostic trouble code definitions (DTCs).

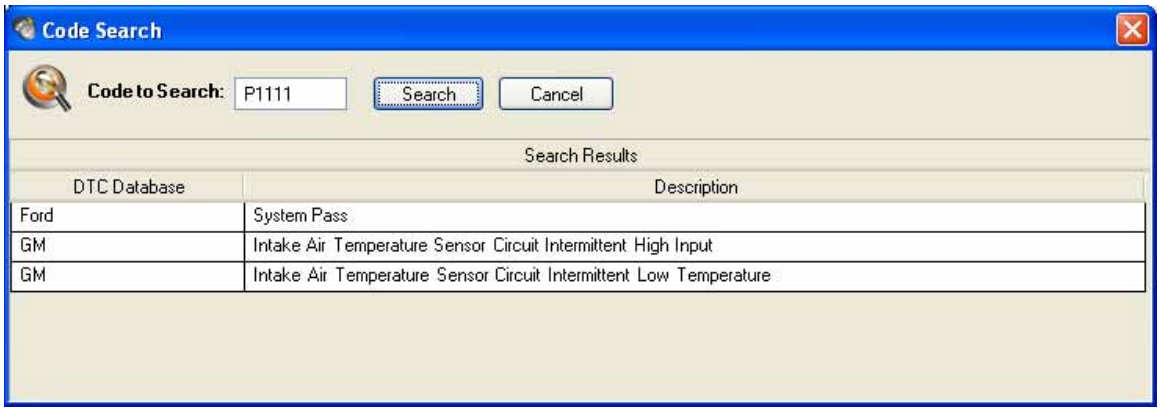


Figure 23: Code Search Dialog

Generic codes and enhanced codes have predefined numeric ranges as shown in Table 5: DTC Groupings.

Table 5: DTC Groupings

ISO/SAE Controlled (Generic)	Manufacturer Controlled (Enhanced)
P0000 to P0999	P1000 to P1999
P2000 to P2999	P3000 to P3399
P3400 to P3999	

1. Select the Tools | Code Search... menu option.
2. Type a code into the Code to Search field (e.g. P1234). The code must start with a P, B, C or U and end with a 4-digit number.
3. Press the Search button. If a definition is found, it will display in the Search Results table.

Import

The Import feature allows users with the Laptop-Dyno™ for Palm OS software product to import files recorded on a Palm OS device. Acceleration, Power Torque, and Scan Data files may be imported and viewed within the Laptop-Dyno™ for Windows software.

The Import feature is located on the File | Import | Palm PDB File... menu option.

Export

The Export feature allows files to be exported into a comma separated values (CSV) file format. Acceleration, Power Torque, and Scan Data files may be exported.

The Export feature is located on the File | Export | Comma Separated Values... menu option.

CHAPTER 5

Dyno Operation

The Dyno software is designed for easy operation. This section shows how to operate the Dyno features and describes the features on each screen.

Dyno operations require driving the vehicle while the software records performance data. For increased safety, the software does not require user intervention during the test runs. All data is recorded for later analysis and audible tones are used to convey instructions to the user while driving.

Ensure the PC, cable, and OBD II adapter do not interfere with the vehicle controls. A cable dangling in front of the foot pedals, gear shifter, or steering wheel can interfere with vehicle operation and cause a fatal accident. Always ensure the PC, cable, and OBD II adapter are securely fastened out of the way. If the scan tool cannot be safely attached as to not interfere with the vehicle controls, then do not drive the vehicle with the OBD II adapter connected to the vehicle.

Never race or exceed the posted speed limit while on public highways. The dynamometer operations require accelerating to high speeds. Always uses a closed course raceway when performing dynamometer and acceleration tests.

Do not attempt to operate or observe the scan tool while driving a vehicle. Driving requires the full attention of the driver. Operating or observing the scan tool will cause driver distraction and could cause a fatal accident.

Theory of Operation

A dynamometer, or dyno for short, is used to measure the power produced by an engine. Until now, automotive dynos were either crankshaft dynamometers or chassis dynamometers.

Crankshaft dynos require the motor to be removed from the vehicle. The power is measured directly at the crankshaft, or flywheel, and is not affected by transmission and

axle powertrain losses. Vehicle manufacturers spec crankshaft power on new cars and trucks.

Chassis dynos test the entire vehicle. The vehicle is tied down to a large machine and the drive wheels are placed over a rotating drum. The chassis dyno tests the entire powertrain system, not just the crankshaft power. This is a more realistic test since it measures the power delivered to the wheels, not just the crankshaft. As such, the power figures measured are always less than with a crankshaft dyno since the powertrain robs some power from the vehicle.

Clearly pulling the motor to use a crankshaft dyno is beyond most people, and chassis dynos can run $150 and hour or more to operate.

Nology Laptop-Dyno™ for Windows

The Nology Laptop-Dyno™ for Windows software is a newly developed device designed expressly for the automotive enthusiast. It uses the OBD II computer port located on all 1996 and newer automobiles to compute engine power, acceleration times, fuel economy, and more.

The Laptop-Dyno™ for Windows is the only dyno to test the vehicle in a completely real world situation that includes powertrain losses, drag from disk brakes and wheel bearings, tire rolling resistance, etc. – everything a vehicle sees on the street.

Aerodynamic drag is compensated for within the calculations. So, whether your vehicle has the aerodynamics of a Chevy Suburban or a Porsche 911, the power calculations can correct for losses due to wind drag.

Weather conditions affect the output of an internal combustion motor. A correction factor is applied to compensate the measurements for weather conditions and elevation. The industry standard document for horsepower and torque corrections is SAE J1349. The Laptop-Dyno™ for Windows software applies this correction factor to all horsepower and torque measurements.

By applying these correction factors to the dyno results, a vehicle dyno'd in Denver on a hot day will give the same results as a chilly day in San Diego. Using the Laptop-Dyno™ for Windows, measurements generated are comparable with one another the world over.

The dyno runs are performed in a single gear. Any gear will work, however increased accuracy is obtained if the software has an increased measurement duration. For instance, the time to accelerate from 1000 RPM to 5000 RPM in 1st gear is a shorter duration than it would be in 3rd gear. Therefore, using 2nd or 3rd gear for dyno runs offers longer test durations for greater accuracy.

Extensive comparison testing on a Dynojet chassis dynamometer has shown the Laptop-Dyno™ for Windows to be extremely accurate.

Automatic Transmissions

All automatic transmissions are equipped with a torque converter. The torque converter is designed to slip under certain conditions, such as at low RPM and under heavy load. When the torque converter slips, the gear ratio is artificially lower and the RPM is higher than if the torque converter is locked up in direct drive. At cruising speeds and under low load requirements, the torque converter locks up for increased fuel economy.

Under heavy acceleration, the slippage is greatest below 3000 RPM. Above 3000 RPM the slippage is still evident but to a lesser degree.

A slipping torque converter is perfectly normal. Automatic transmissions are designed to slip, which gives them some advantages when towing a heavy load. However, this causes an anomaly known to all chassis dynos and the Laptop-Dyno™ for Windows.

Since the RPM is higher than normal while the torque converter is slipping below 3000 RPM, the power vs. torque graphs may display an unnaturally large swell below 3000 RPM. This swell is the torque converter multiplying the engines available torque. The swell is normal and all dynos exhibit this behavior. The power torque figures above 3000 RPM are the real numbers generally used for evaluation.

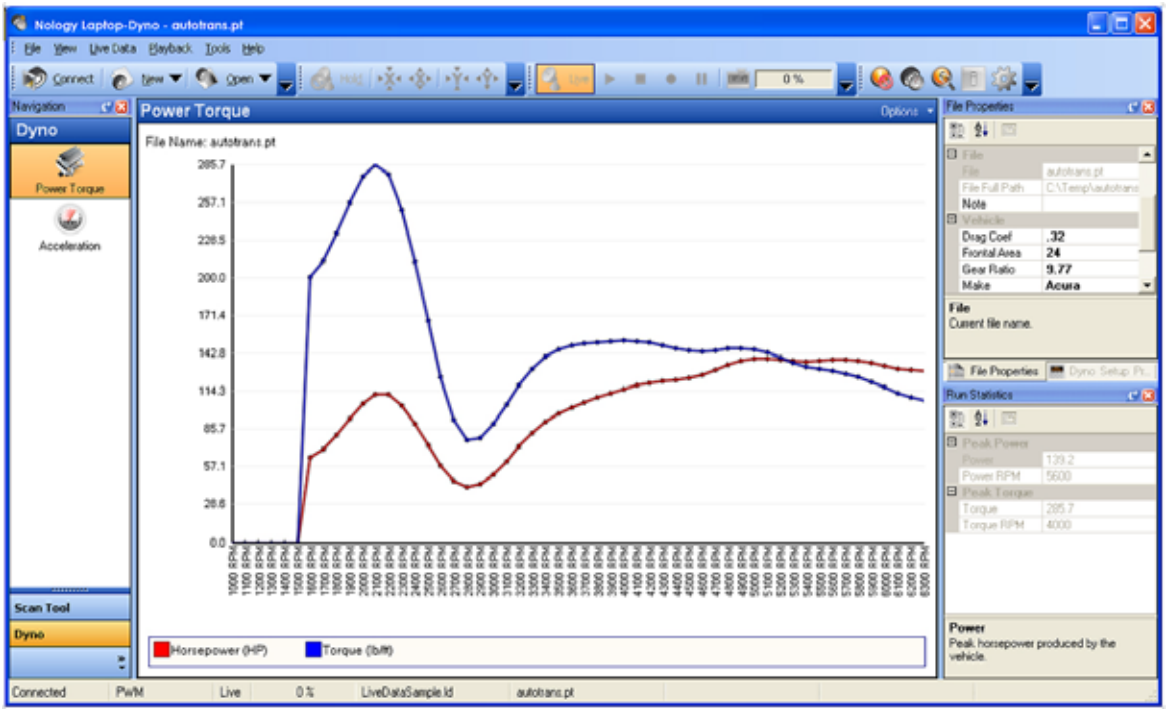


Figure 24: Power Torque Run Automatic Transmission

Fast Sampling

The Fast Sampling preference on the Options dialog must be enabled to achieve accurate dyno operation. Ensure this option is selected whenever using Dyno features.

Dyno Files

The Dyno feature use three storage file types:

Power Torque – stores Power and Torque run data.

Acceleration – stores Acceleration run data.

Dyno Setup – stores Dyno setup variables such as vehicle weight, elevation, humidity, etc.

Each of the files may be opened from the File | Open menu option. See Laptop-Dyno™ File Types for more information.

The properties of each file may be viewed and modified in either the File Properties or Dyno Setup Properties docking window. See Properties Windows for more information.

Dyno Setup File Properties

The Dyno Setup file properties are changed on the Dyno Setup Properties Docking Window. The file attributes are:

File – file name.

File Full Path –file name and path.

Weight – weight of the vehicle including passengers during the run.

Gear Ratio – the overall gear ratio of the vehicle, which includes transmission and axle.

Tire Diameter – the vehicle tire diameter.

Temperature – current outside temperature.

Elevation –elevation at the test track.

Humidity – current outside humidity.

Pressure – current outside altimeter pressure available from www.nws.noaa.gov. Altimeter pressure is different than barometric pressure.

Drag Coef – drag coefficient of vehicle.

Frontal Area – the frontal area of the vehicle.

Note – an optional text note.

Make – Vehicle make.

VIN – vehicle identification number.

Year – model year of vehicle.

The software can measure the gear ratio and compute the tire diameter for you. See Compute Gear Ratio for more information.

Common drag coefficients are usually in the range of 0.25 to 0.45 – the lower the number the less wind drag on the vehicle.

Frontal areas are usually in the range of 17 to 28 sq. ft – the lower the number the less frontal area. Smaller vehicles have lower frontal areas.

To get an understanding for these numbers, Table 6: Drag Coefficients and Frontal Areas list the values for different vehicle types.

Table 6: Drag Coefficients and Frontal Areas

Vehicle	Drag Coefficient	Frontal Area (sq/ft)
1999 Chevy Cavalier	0.36	21.5
2000 Ford Taurus	0.32	23.7
2000 Chevy Silverado 1500 2WD	0.45	28.0
2000 Ford Explorer	0.45	25.8
2002 Honda Insight	0.25	20.5
2002 Honda Civic Hatchback	0.36	20.5
2000 Acura Integra	0.32	20.1
2000 Volvo S40	0.32	20.9
2000 Mercedes E320	0.29	22.3
2000 Chrysler LHS	0.31	23.1

See the Nology Vehicle Specifications document for more information on your specific vehicle make and model.

An Internet search is another good source of drag coefficients and frontal areas for your exact vehicle type.

Calculation of Frontal Area

Frontal area can be calculated for any car. The frontal area represents the front projection area of the vehicle. If one takes a straight-on picture of the front of a vehicle, it is the area included in the outline. Use the following to calculate:

1. Calculate the area of a rectangle, which would encompass the front of the vehicle (multiply width by the height).

2. Adjust the figure obtained above for areas not included, such as top rounded corners, etc. Typical adjusting values are 85 percent for cars, and 100 percent for trucks.

Dyno Setup File Properties Usage

The Dyno Setup file stores vehicle setup variables. When a power torque run is performed, the Dyno Setup file settings are copied into the Power Torque file. Similarly, the current Dyno Setup file is copied into the Acceleration file for acceleration runs.

Once the settings are copied from the Dyno Setup file to the Power Torque or Acceleration file, there is no tie to the original Dyno Setup file. Meaning if you change a Dyno Setup file, it does not affect any stored Power Torque or Acceleration properties.

Compute Gear Ratio Dialog

The Gear Ratio screen measures the overall gear ratio of the vehicle and computes a tire diameter given the tire size. The screen is located on the Tools | Compute Gear Ration menu option.

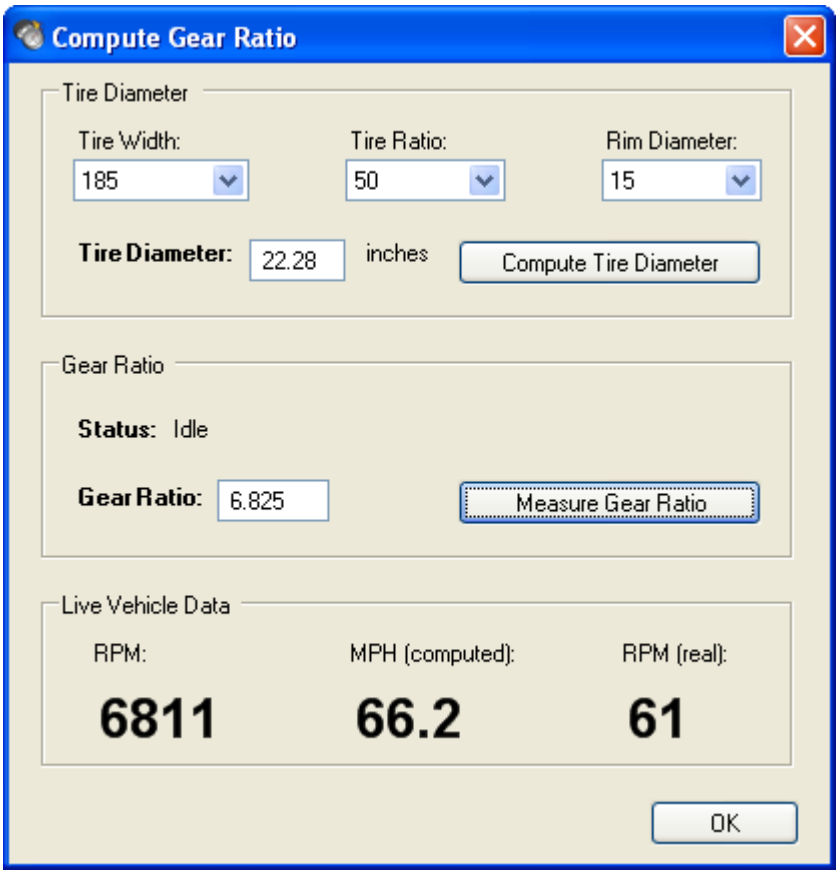


Figure 25: Compute Gear Ratio Dialog

Tire Diameter

Computing a tire diameter requires entering the tire size. Most passenger car tire sizes are listed as width, ratio, and rim diameter (e.g. 205/65 R15).

Enter the tire size using the Width, Ratio, and Rim Dia drop down lists. Once entered, press the Compute Tire Diameter to calculate the tire diameter in inches.

Many large truck tire sizes are sized differently. These tires are listed as diameter, width, and rim diameter (e.g. 31x10.5 R16). In this case, the first number is used as the tire diameter, in inches (e.g. 31”), and entered directly into the Tire Diameter field.

Manufacturers are usually off very slightly from the indicated tire size. Many manufactures list the exact tire diameter on their website. If available, use the tire diameter listed on the manufacturer’s datasheet.

Measuring Overall Gear Ratio

Measuring the vehicle gear ratio involves keeping the vehicle speed steady while the software computes an overall gear ratio. The gear ratio changes with each transmission gear. Therefore, the software computes one overall gear ratio per gear ratio run (e.g. overall gear ratio for 2nd gear). The overall gear ratio is the combination of the transmission gear ratio and the final drive gear ratio.

The Status field lists the status of the gear ratio run, either:

Idle – no data is being gathered.

Countdown to Start – shows the number of seconds until data collection begins.

Collecting Data – vehicle data is being recorded.

A tire diameter must be entered in the Tire Diameter field before performing a gear ratio run. Pressing Measure Gear Ratio will start a gear ratio run.

Once a tire diameter is entered, pressing the Measure Gear Ratio button starts the 10-second countdown. During this time, get the vehicle moving in the gear the run is going to be performed in (e.g. 2nd gear). The vehicle RPM should be between 3000 and 4000 RPM for best results. Once the gear and RPM is achieved, keep the throttle steady and clutch out (if a manual transmission).

At the end of the countdown, the software will beep. After the beep continue to keep the throttle steady until a second beep is heard (about 10 seconds). The second beep indicates the gear ratio run is over.

Bring the vehicle to a complete stop. The measured overall gear ratio is displayed.

Calculating Overall Gear Ratio

The overall gear ratio can also be computed if the tire diameter and RPM at a speed is known. The following formula computes the overall vehicle gear ratio used by the dyno software:

overall gear ratio = RPM x tire diameter / MPH x 336

Example car:

3.57 = 3000 RPM x 26” / 65 MPH x 336

The preferred method is to use the Laptop-Dyno™ to compute the overall gear ratio. If calculating, always confirm your ratio calculation is correct by performing the procedure in section Confirming Gear Ratio Result.

Confirming Gear Ratio Result

At the bottom of the Gear Ratio screen are three live values:

RPM – current measured RPM.

MPH (computed) – computed MPH using only RPM and the gear ratio.

MPH (real) – real MPH measured via the vehicle’s on-board computer.

MPH (computed) will only display if values are entered into the Tire Diameter and Gear Ratio fields. If the computed MPH and real MPH values match throughout the RPM range then the gear ratio and tire diameter values are correct for this vehicle. If they do not match, adjust the Gear Ratio field up or down until the computed and real MPH match.

A computed verses real MPH check in a single gear might be:

1. Keep a steady speed at 2000 RPM.
2. Confirm the computed and real MPH values match.
3. Increase speed to a steady 4000 RPM.
4. Confirm the computed and real MPH values match.

Always have a passenger confirm the computed and real MPH readings match. Driving requires the full attention of the driver. Operating or observing the scan tool while driving will cause driver distraction and could cause a fatal accident.

Computing a gear ratio requires an accurate speedometer. If the vehicle’s tire size is either smaller or larger than stock and the speedometer has not been recalibrated to the new wheel size, then the computed gear ratio will be incorrect. This will make the horsepower and torque figures higher or lower than expected.

Using Tire Diameter and Gear Ratio

After obtaining the tire diameter and gear ratio, the values are entered into the Gear Ratio and Tire Diameter fields within a Dyno Setup file. See Dyno Setup File for more information.

TIP: To have multiple gear ratio setups for the same car, create a Dyno Setup file for each gear with file names like Ford1stGear, Ford2ndGear, etc.

Automatic Transmissions

The software uses the gear ratio on the power torque run, which is performed under heavy acceleration. The gear ratio run, however, is performed under essentially a no-load condition where the torque converter slippage is negligible. Therefore, for automatic transmissions the measured gear ratio may have to be lowered by 5 to 15% to account for the torque converter slippage. Otherwise, the power and torque curves will show lower than expected results.

Power Torque Screen

The Power. Torque screen analyzes power and torque data gathered from a vehicle run.

Figure 26: Power Torque Screen

The power torque graph shows the relationship between horsepower/torque and engine RPM. The vertical axis shows the power and torque. The horizontal axis shows the engine RPM.

The value at any point along the curve is obtained by placing the mouse cursor (circle) over a data point.

The File Properties displays the settings used to compute the power torque curve. When the File Properties are modified the graph dynamically updates to show the newly computed curve. See Dynamic Graph Update Using File Properties for more information.

Dynamic Graph Update Using File Properties

The File Properties docking window offers the ability to change parameters stored within the file (see File Properties Docking Window). When the Power Torque screen is displayed, modifying these File Properties causes the Power Torque graph and Run Statistics to recompute based upon the new values.

Similarly, the Acceleration screen offers file properties. However, only Weight within the File Properties docking window changes the computed Horsepower in the Run Statistics docking window. Unlike power and torque, the acceleration graph is not derived from mathematical computations and therefore the Acceleration File Properties are for informational purposes only.

For instance, if the Power Torque file properties Elevation value is changed from 1000 feet to 9000 feet, the graph will redraw using the new input parameter.

See Properties Windows for more information about changing properties.

Dyno Run Dialog (Power Torque)

The Dyno Run dialog acquires the data from a power torque or acceleration run.

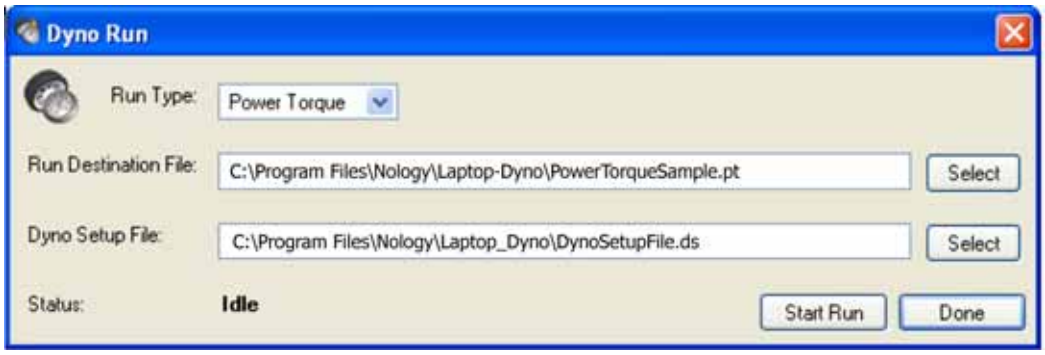


Figure 27: Power Torque Run

Two files are required to perform a power torque run: a Power Torque and a Dyno Setup file. The Power Torque file is the destination for the collected run data. The Dyno Setup file provides the operational parameters used by the software to compute horsepower and torque.

The Status field shows the status of the run, either:

Idle – no data is being gathered.

Countdown to Start – shows the number of seconds until data collection begins.

Collecting Data – vehicle data is being recorded.

Performing a Power Torque Run

Before the run, ensure the laptop, RS-232 cable, and OBD II adapter are securely fastened out of the way and do not interfere with vehicle operation.

Once the Power Torque file and Dyno Setup files are selected, pressing the Start Run button starts the 10-second countdown.

During the countdown, get the vehicle moving in the gear the run is going to be performed in (e.g. 2nd gear). The vehicle RPM during the countdown should be relatively low, under 2000 RPM, the throttle steady, and clutch out (if a manual transmission).

At the end of the countdown, the software will beep. At the beep, floor the accelerator to achieve maximum acceleration.

Once maximum RPM is reached, either shift to the next higher gear or decelerate the vehicle by letting off the accelerator. Bring the vehicle to a complete stop and press Done to stop data collection.

Power Torque Run Do's and Don'ts

For safety and the most accuracy from the Dyno software, please follow the guidelines below.

Keep your attention on driving – the software is designed to require no user intervention when a run is performed. Start the power torque run while the vehicle is stopped. During the countdown, accelerate to the correct gear and starting RPM. Audible tones signal when to accelerate the vehicle.

Consistent vehicle setup – use the same tire pressure, same number of passengers, no A/C, windows rolled up, low beams on, radio and other accessories off.

Automatic transmission – most automatic transmissions will want to downshift under hard acceleration. Experiment with higher starting RPM or roll the throttle on slowly at first to prevent a downshift.

Manual transmission – ensure the clutch is completely out when the data collection starts.

Steady throttle – do not "blip" the throttle during the countdown period. Keep the throttle and RPM steady.

Maximum throttle – keep the throttle fully floored until maximum RPM is achieved. A dip in the RPM will cause the power torque graphs to terminate early[4].

Dyno setup – try to obtain current temperature, humidity, elevation, and altimeter pressure before each day of runs.

[4] Use common sense – let off the accelerator if something gets in the way of the vehicle.

Head/Tail Wind – a windy day will skew the power/torque results higher or lower depending on the wind direction. A relatively calm day provides the best results.

Level Ground – an uphill climb will make the power/torque lower and conversely a downhill run will have higher than expected values. Level ground provides the best results.

Heat soak – repeated runs will cause the intake manifold temperature to increase. Hot air is less dense and causes a reduction in power/torque. Just note that the first run may have slightly higher values than subsequent runs if performed back-to-back.

Power Torque Run Statistics

The Run Statistics docking window calculates the peak horsepower and torque at RPM values for the currently opened Power Torque file.

Power – peak horsepower output during the run.

Peak RPM – the RPM peak power was achieved.

Torque – peak torque output during the run.

Torque RPM – the RPM peak torque was achieved.

Acceleration Screen

The Acceleration screen analyzes acceleration data gathered from a vehicle run.

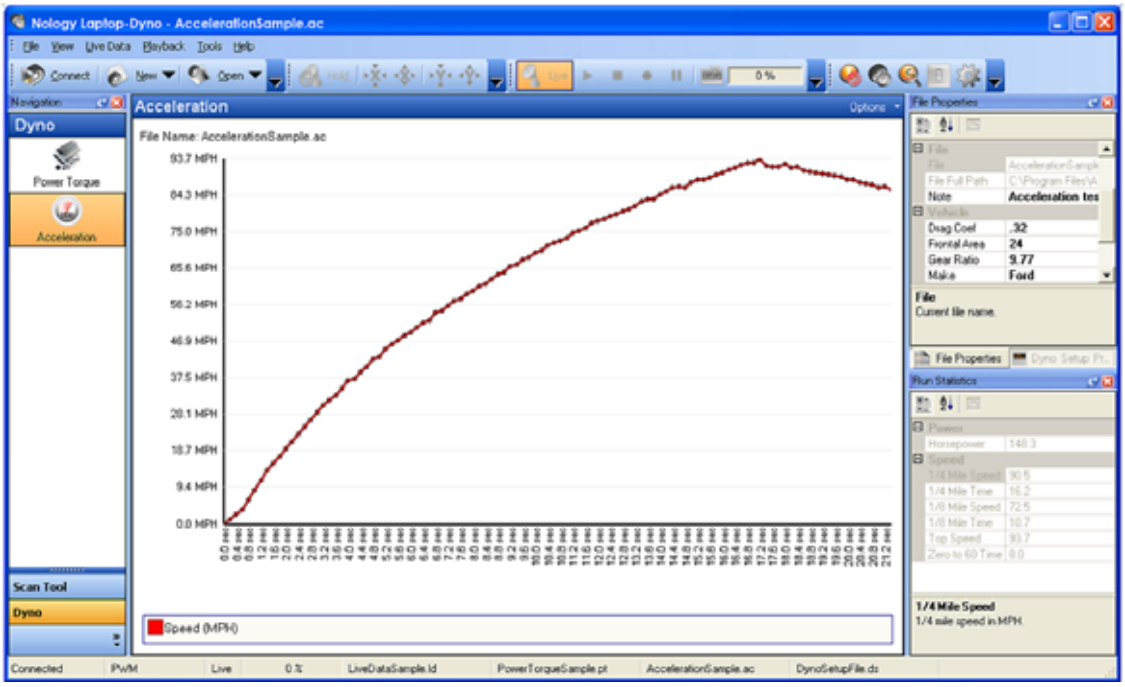


Figure 28: Acceleration Screen

The acceleration graph shows the relationship between vehicle speed over time. The vertical axis shows the vehicle speed in MPH. The horizontal axis shows the time in seconds.

The value at any point along the curve is obtained by placing the mouse cursor over a data point.

Dyno Run Dialog (Acceleration)

The Dyno Run dialog acquires the data from an acceleration run.

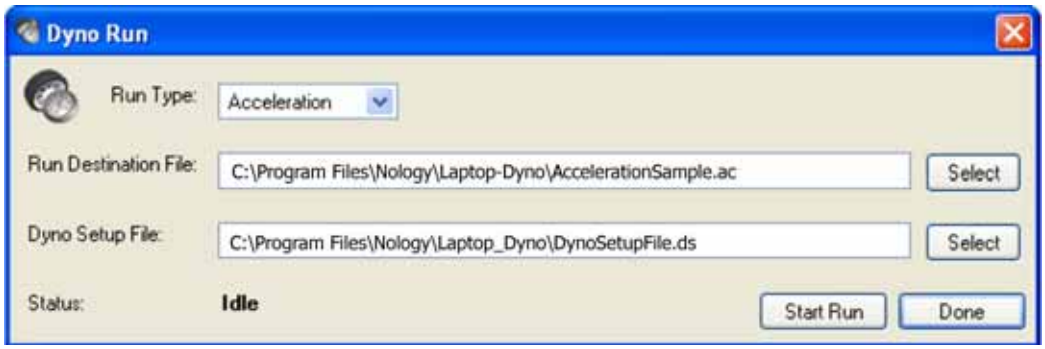


Figure 29: Acceleration Run Dialog

Two files are required to perform an acceleration run: an Acceleration file and a Dyno Setup file. The Acceleration file is the destination for the collected run data. The Dyno Setup file provides the operational parameters used by the software to compute a 1/4-mile horsepower figure.

The Status field shows the current status of the run, either:

Idle – no data is being gathered.

Waiting to Start – waiting for the vehicle to start moving.

Collecting Data – vehicle data is being recorded.

Performing an Acceleration Run

Before the run, ensure the laptop, RS-232 cable, and OBD II adapter are securely fastened out of the way and do not interfere with vehicle operation.

Once the Acceleration file and Dyno Setup files are selected, press the Start Run button.

The acceleration run is performed from a standing start. Once the Status field says "Waiting to Start", the software is waiting for the vehicle to start accelerating. The acceleration run does not use RPM like a power torque run does. Therefore, while waiting to accelerate you may rev the motor or do whatever else you think will achieve the quickest acceleration time.

As you accelerate down the track, you may stop the acceleration run at different data points depending on the data you're trying to collect.

60 MPH – if acceleration stops after 60 MPH is reached, the 0-60 time will be computed.

1/8 mile – if acceleration stops after 1/8 mile reached, the 1/8-mile time and speed is computed.

1/4 mile – if acceleration stops after 1/4 mile reached, the 1/4-mile time and speed is computed. In addition, a 1/4-mile horsepower value is computed.

Its best to accelerate slightly beyond a data point to ensure the software captures the vehicle passing through the data point at maximum acceleration. For instance, don't let off the accelerator at exactly 60 MPH. Accelerate just beyond 60for approximately ½ second to achieve the best results.

Bring the vehicle to a complete stop and press the Done button to stop data collection.

Acceleration Run Do's and Don'ts

For safety and the most accuracy from the Dyno software, please follow the guidelines below.

Keep your attention on driving – the software is designed to require no user intervention when a run is performed.

Consistent vehicle setup – use the same tire pressure, same number of passengers, no A/C, windows rolled up, low beams on, radio and other accessories off.

Head/Tail Wind – a windy day will skew the acceleration results higher or lower depending on the wind direction. A relatively calm day provides the best results.

Level Ground – an uphill climb will make the acceleration lower and conversely a downhill run will have higher than expected values. Level ground provides the best results.

Heat soak – repeated runs will cause the intake manifold temperature to increase. Hot air is less dense and causes a reduction in power/torque. Just note that the first run may have slightly faster values than subsequent runs if performed back-to-back.

Accelerate Just Past Data Point - accelerate slightly beyond a data point (e.g. 60 MPH, 1/8 mile, or 1/4 mile) to ensure the software captures the vehicle passing through the data point at maximum acceleration

If the vehicle's tire size is either smaller or larger than stock and the speedometer has not been recalibrated to the new wheel size, then the computed acceleration figures will be incorrect. Acceleration runs require an accurate speedometer.

Acceleration Run Statistics

The Run Statistics screen computes times and horsepower values based upon how fast the vehicle accelerates.

Top Speed – maximum speed achieved during the run.

0 to 60 Time – how fast in seconds the vehicle traveled from 0 to 60 MPH.

1/8 Mile Speed – how fast in MPH the vehicle was traveling at the 1/8-mile mark.

1/8 Mile Time – time in seconds, the vehicle traveled a 1/8-mile.

1/4 Mile Speed – how fast in MPH the vehicle was traveling at the 1/4-mile mark.

1/4 Mile Time – time in seconds, the vehicle traveled a 1/4-mile.

1/4 Mile HP – a rough calculation of horsepower based strictly on 1/4-mile time and vehicle weight.

N/A will be displayed in a column if the vehicle didn't travel far enough to compute the statistic.

CHAPTER 6

Demo Mode

Demonstration mode simulates all vehicle data. This mode facilitates learning about scan tool features without connecting to a live vehicle.

Enable Demo Mode

Demo mode is enabled from the File | Connect dialog.

1. Select the "Connect to Vehicle Demo" checkbox on the Connect screen.

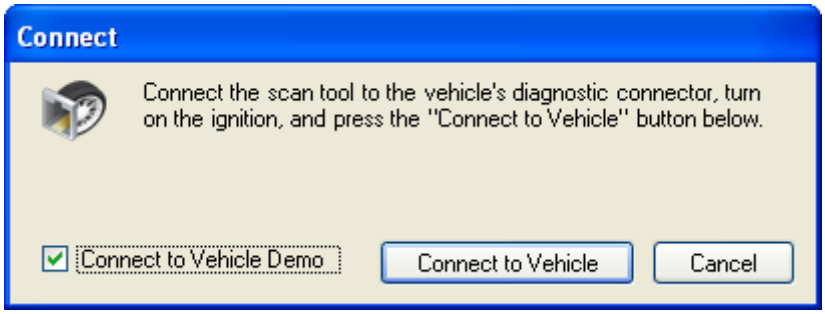

Connect
Connect the scan tool to the vehicle's diagnostic connector, turn on the ignition, and press the "Connect to Vehicle" button below.
Connect to Vehicle Demo
Connect to Vehicle
Cancel

Figure 30: Connect to Vehicle Demo

2. Press the "Connect to Vehicle" button. With demo mode enabled, all vehicle data is simulated – even if the scan tool is connected to a vehicle.

CHAPTER 7

Export File Format

The File | Export | Comma Separated Values feature converts files into a CSV file suitable for import into a spreadsheet application such as Microsoft Excel. The file format is a comma delimited file and, as such, almost any spreadsheet package should be able to import the data.

Once the data is imported into the spreadsheet, numerous data manipulations are possible such as graphing and analyzing the data.

CSV File Format

The CSV file is a tabular format of data placed into rows and columns. The first row contains basic file information:

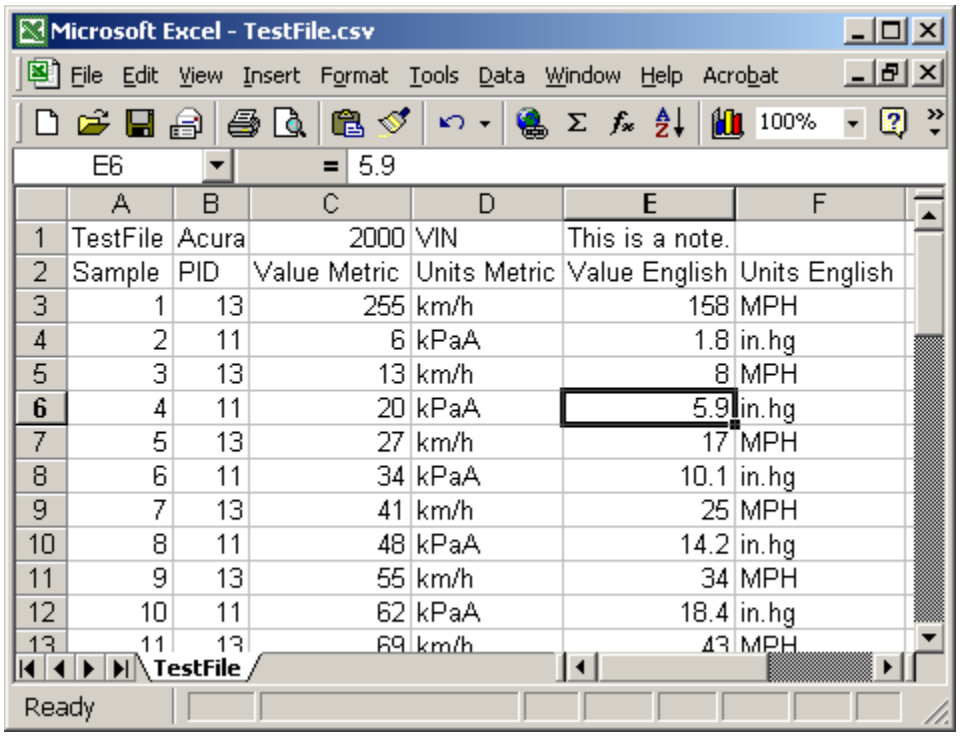
File Name – the name of the PDB file.

Make – make of the vehicle.

Year – the year of the vehicle.

VIN – the optional VIN number field.

Note – the optional note field.



	A	B	C	D	E	F
1	TestFile	Acura	2000	VIN	This is a note.	
2	Sample	PID	Value Metric	Units Metric	Value English	Units English
3	1	13	255	km/h	158	MPH
4	2	11	6	kPaA	1.8	in.hg
5	3	13	13	km/h	8	MPH
6	4	11	20	kPaA	5.9	in.hg
7	5	13	27	km/h	17	MPH
8	6	11	34	kPaA	10.1	in.hg
9	7	13	41	km/h	25	MPH
10	8	11	48	kPaA	14.2	in.hg
11	9	13	55	km/h	34	MPH
12	10	11	62	kPaA	18.4	in.hg
13	11	13	69	km/h	43	MPH

Figure 31: CSV File in Excel

The second row contains the column headings for the scan data. Metric values are always included in the CSV file, however if there is no corresponding English units of measure for a sensor then no conversion is shown.

Sample – the sample number.

PID – the sensor PID (see Table 7: PID to Parameter Mapping).

Value Metric – the sensor value in Metric units.

Units Metric – the Metric units of measure.

Value English – the sensor value in English units.

Units English – the English units of measure.

Sensor PID

A PID (parameter ID) is a number that corresponds to a parameter. The following table maps parameter IDs to parameter names.

Table 7: PID to Parameter Mapping

PID	Parameter	PID	Parameter
4	Calculated Load Value	44	Commanded EGR
5	Engine Coolant Temp	45	EGR Error
6	Short Term Fuel Trim-B1	46	Evaporative Purge
7	Long Term Fuel Trim-B1	47	Fuel Level Input
8	Short Term Fuel Trim-B2	48	Warm-ups Since DTCs Cleared
9	Long Term Fuel Trim-B2	49	Distance Since DTCs Cleared
10	Fuel Rail Pressure (gauge)	50	Evap System Vapor Pressure
11	Intake Manifold Pressure	51	Barometric Pressure
12	Engine RPM	52	O2 Sensor B1-S1 Wide Range mA
13	Vehicle Speed	53	O2 Sensor B1-S2 Wide Range mA
14	Ignition Timing Advance	54	O2 Sensor B1-S3 Wide Range mA
15	Air Intake Temperature	55	O2 Sensor B1-S4 Wide Range mA
16	Air Flow Rate from MAF	56	O2 Sensor B2-S1 Wide Range mA
17	Absolute Throttle Position	57	O2 Sensor B2-S2 Wide Range mA
20	O2 Sensor B1–S1	58	O2 Sensor B2-S3 Wide Range mA
21	O2 Sensor B1–S2	59	O2 Sensor B2-S4 Wide Range mA
22	O2 Sensor B1–S3	60	Catalyst Temp Bank 1 – Sensor 1
23	O2 Sensor B1–S4	61	Catalyst Temp Bank 2 – Sensor 1
24	O2 Sensor B2–S1	62	Catalyst Temp Bank 1 – Sensor 2
25	O2 Sensor B2–S2	63	Catalyst Temp Bank 2 – Sensor 2
26	O2 Sensor B2–S3	66	Control Module Voltage
27	O2 Sensor B2–S4	67	Absolute Load Value
31	Time Since Engine Start	68	Commanded Equivalence Ratio
33	Distance Traveled While MIL On	69	Relative Throttle Position
34	Fuel Rail Pressure Rel Manifold	70	Ambient Air Temperature
35	Fuel Rail Pressure	71	Absolute Throttle Position B
36	O2 Sensor B1-S1 Wide Range V	72	Absolute Throttle Position C
37	O2 Sensor B1-S2 Wide Range V	73	Accelerator Pedal Position D
38	O2 Sensor B1-S3 Wide Range V	74	Accelerator Pedal Position E
39	O2 Sensor B1-S4 Wide Range V	75	Accelerator Pedal Position F
40	O2 Sensor B2-S1 Wide Range V	76	Commanded Throttle Actuator
41	O2 Sensor B2-S2 Wide Range V	77	Minutes Run with MIL On
42	O2 Sensor B2-S3 Wide Range V	78	Time Since DTCs Cleared
43	O2 Sensor B2-S4 Wide Range V		

CHAPTER 8

Troubleshooting

This section contains solutions for common problems encountered with the scan tool.

Scan Tool Connects but No Sensor Data

If no Live data is displayed in the Live Data screens, try the following remedies:

1. Disable the Fast Sampling option in the Tools | Options dialog.

Can't Open COM Port

The COM port is either busy or does not exist, try the following remedies:

1. Try selecting another COM port.

2. If you use a Palm handheld computer with your computer, disable the Local Serial checkmark on the HotSync icon located on the Windows taskbar by right mouse clicking on the HotSync icon. Alternatively, right mouse click the HotSync icon and select Exit.

3. If you have a PocketPC or Windows CE PDA, disable ActiveSync.

No Communication (Scan Tool)

If the No Communication (Scan Tool) dialog appears, this means the software cannot communicate with the vehicle. Try the following remedies:

1. Ensure the vehicle ignition is turned on. Vehicle does not have to be running; however, it can be.

2. Try pressing the "Connect to Vehicle" button again.

3. Ensure the OBD II Adapter is securely plugged into the vehicle's OBD II connector.

4. Ensure the RS-232 cable is securely plugged into the PC.

5. Ensure the vehicle is OBD II compliant (see Supported Vehicles).

6. Ensure no vehicle fuses are blown. OBD II adapter power is derived from the vehicle and a blown fuse could prevent power from reaching the scan tool.

No Communication (Vehicle)

If the No Communication (Vehicle) dialog appears, see No Communication (Scan Tool).

Lost Communication

If the Lost Communication dialog appears, this means the software initially established communication but subsequently lost it. Try the following remedies:

1. Ensure the OBD II Adapter is securely plugged into the vehicle's OBD II connector.

2. Ensure the RS-232 cable is securely plugged into the PC.

Oxygen Sensors Test Results Pane is Blank

Not all vehicles support the features provided by the Oxygen Sensor screen. If the vehicle does not support this feature, the data for the screen will be blank.

Freeze Frame Pane is Blank

If the vehicle has not detected a failure that caused the Check Engine to illuminate, the data for the Freeze Frame pane will be blank.

Clearing Codes Did Not Work or MIL Didn't Turn Off

There are a few possible causes for the check engine light not to extinguish or the DTCs to reappear on the scan tool. First, if the problem is not fixed the DTC may return immediately for problems such as misfires, open or shorted sensors, etc. Second, some vehicles can't be running when the memory is cleared. In these cases, ensure the key is on but the engine is off before attempting to clear the memory. Last, some vehicles require, after the codes are cleared, for the ignition key to be turned off and then on again before the MIL light actually turns off.

APPENDIX A

Diagnostic Trouble Codes

A Diagnostic Trouble Code (DTC) is a 5-digit value starting with a letter.

The DTC's codes listed here are generic to all manufacturers. These generic Diagnostic Trouble Codes are those codes where industry uniformity has been achieved. However, each vehicle manufacturer may optionally create new codes beyond the generic ones. The Nology Laptop-Dyno™ for Windows can read these enhanced manufacturer specific codes.

The DTC database files included with the software incorporates thousands of more codes, both generic and enhanced, than those listed here. The following listing simply provides an overview of the types of codes available.

Diagnostic Trouble Code Format Structure

The Diagnostic Trouble Code numbering follows a standardized structure. All Diagnostic Trouble Codes have a letter followed by a 4-digit number (e.g. P1234). The first letter indicates the type of code:

P = Powertrain
C = Chassis
B = Body
U = Network Communication

The remaining 4-digit number specifies the problem within that system.

P00XX Fuel and Air Metering and Auxiliary Emission Controls

P0010	"A" Camshaft Position Actuator Circuit	(Bank 1)
P0011	"A" Camshaft Position - Timing Over-Advanced or System Performance	(Bank 1)
P0012	"A" Camshaft Position - Timing Over-Retarded	(Bank 1)
P0013	"B" Camshaft Position - Actuator Circuit	(Bank 1)
P0014	"B" Camshaft Position - Timing Over-Advanced or System Performance	(Bank 1)
P0015	"B" Camshaft Position -Timing Over-Retarded	(Bank 1)
P0020	"A" Camshaft Position Actuator Circuit	(Bank 2)
P0021	"A" Camshaft Position - Timing Over-Advanced or System Performance	(Bank 2)
P0022	"A" Camshaft Position - Timing Over-Retarded	(Bank 2)
P0023	"B" Camshaft Position - Actuator Circuit	(Bank 2)
P0024	"B" Camshaft Position - Timing Over-Advanced or System Performance	(Bank 2)
P0025	"B" Camshaft Position - Timing Over-Retarded	(Bank 2)
P0030	HO_2S Heater Control Circuit	(Bank 1 Sensor 1)

P0031	HO_2S Heater Control Circuit Low	(Bank 1 Sensor 1)
P0032	HO_2S Heater Control Circuit High	(Bank 1 Sensor 1)
P0033	Turbo Charger Bypass Valve Control Circuit	
P0034	Turbo Charger Bypass Valve Control Circuit Low	
P0035	Turbo Charger Bypass Valve Control Circuit High	
P0036	HO_2S Heater Control Circuit	(Bank 1 Sensor 2)
P0037	HO_2S Heater Control Circuit Low	(Bank 1 Sensor 2)
P0038	HO_2S Heater Control Circuit High	(Bank 1 Sensor 2)
P0042	HO_2S Heater Control Circuit	(Bank 1 Sensor 3)
P0043	HO_2S Heater Control Circuit Low	(Bank 1 Sensor 3)
P0044	HO_2S Heater Control Circuit High	(Bank 1 Sensor 3)
P0050	HO_2S Heater Control Circuit	(Bank 2 Sensor 1)
P0051	HO_2S Heater Control Circuit Low	(Bank 2 Sensor 1)
P0052	HO_2S Heater Control Circuit High	(Bank 2 Sensor 1)
P0056	HO_2S Heater Control Circuit	(Bank 2 Sensor 2)
P0057	HO_2S Heater Control Circuit Low	(Bank 2 Sensor 2)
P0058	HO_2S Heater Control Circuit High	(Bank 2 Sensor 2)
P0062	HO_2S Heater Control Circuit	(Bank 2 Sensor 3)
P0063	HO_2S Heater Control Circuit Low	(Bank 2 Sensor 3)
P0064	HO_2S Heater Control Circuit High	(Bank 2 Sensor 3)
P0065	Air Assisted Injector Control Range/Performance	
P0066	Air Assisted Injector Control Circuit or Circuit Low	
P0067	Air Assisted Injector Control Circuit High	
P0070	Ambient Air Temperature Sensor Circuit	
P0071	Ambient Air Temperature Sensor Range/Performance	
P0072	Ambient Air Temperature Sensor Circuit Low Input	
P0073	Ambient Air Temperature Sensor Circuit High Input	
P0074	Ambient Air Temperature Sensor Circuit Intermittent	
P0075	Intake Valve Control Solenoid Circuit	(Bank 1)
P0076	Intake Valve Control Solenoid Circuit Low	(Bank 1)
P0077	Intake Valve Control Solenoid Circuit High	(Bank 1)
P0078	Exhaust Valve Control Solenoid Circuit	(Bank 1)
P0079	Exhaust Valve Control Solenoid Circuit Low	(Bank 1)
P0080	Exhaust Valve Control Solenoid Circuit High	(Bank 1)
P0081	Intake valve Control Solenoid Circuit	(Bank 2)
P0082	Intake Valve Control Solenoid Circuit Low	(Bank 2)
P0083	Intake Valve Control Solenoid Circuit High	(Bank 2)
P0084	Exhaust Valve Control Solenoid Circuit	(Bank 2)
P0085	Exhaust Valve Control Solenoid Circuit Low	(Bank 2)
P0086	Exhaust Valve Control Solenoid Circuit High	(Bank 2)

P01XX Fuel and Air Metering

P0100	Mass or Volume Air Flow Circuit
P0101	Mass or Volume Air Flow Circuit Range/Performance Problem
P0102	Mass or Volume Air Flow Circuit Low Input
P0103	Mass or Volume Air Flow Circuit High Input
P0104	Mass or Volume Air Flow Circuit Intermittent
P0105	Manifold Absolute Pressure/Barometric Pressure Circuit
P0106	Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance Problem
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input
P0109	Manifold Absolute Pressure/Barometric Pressure Circuit Intermittent
P0110	Intake Air Temperature Circuit
P0111	Intake Air Temperature Circuit Range/Performance Problem
P0112	Intake Air Temperature Circuit Low Input
P0113	Intake Air Temperature Circuit High Input

P0114	Intake Air Temperature Circuit Intermittent	
P0115	Engine Coolant Temperature Circuit	
P0116	Engine Coolant Temperature Circuit Range/Performance Problem	
P0117	Engine Coolant Temperature Circuit Low Input	
P0118	Engine Coolant Temperature Circuit High Input	
P0119	Engine Coolant Temperature Circuit Intermittent	
P0120	Throttle/Pedal Position Sensor/Switch A Circuit	
P0121	Throttle/Pedal Position Sensor/Switch A Circuit Range/Performance Problem	
P0122	Throttle/Pedal Position Sensor/Switch A Circuit Low Input	
P0123	Throttle/Pedal Position Sensor/Switch A Circuit High Input	
P0124	Throttle/Pedal Position Sensor/Switch A Circuit Intermittent	
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	
P0126	Insufficient Coolant Temperature for Stable Operation	
P0127	Intake Air Temperature Too High	
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	
P0130	O2 Sensor Circuit	(Bank 1 Sensor 1)
P0131	O2 Sensor Circuit Low Voltage	(Bank 1 Sensor 1)
P0132	O2 Sensor Circuit High Voltage	(Bank 1 Sensor 1)
P0133	O2 Sensor Circuit Slow Response	(Bank 1 Sensor 1)
P0134	O2 Sensor Circuit No Activity Detected	(Bank 1 Sensor 1)
P0135	O2 Sensor Heater Circuit	(Bank 1 Sensor 1)
P0136	O2 Sensor Circuit Malfunction	(Bank 1 Sensor 2)
P0137	O2 Sensor Circuit Low Voltage	(Bank 1 Sensor 2)
P0138	O2 Sensor Circuit High Voltage	(Bank 1 Sensor 2)
P0139	O2 Sensor Circuit Slow Response	(Bank 1 Sensor 2)
P0140	O2 Sensor Circuit No Activity Detected	(Bank 1 Sensor 2)
P0141	O2 Sensor Heater Circuit	(Bank 1 Sensor 2)
P0142	O2 Sensor Circuit Malfunction	(Bank 1 Sensor 3)
P0143	O2 Sensor Circuit Low Voltage	(Bank 1 Sensor 3)
P0144	O2 Sensor Circuit High Voltage	(Bank 1 Sensor 3)
P0145	O2 Sensor Circuit Slow Response	(Bank 1 Sensor 3)
P0146	O2 Sensor Circuit No Activity Detected	(Bank 1 Sensor 3)
P0147	O2 Sensor Heater Circuit	(Bank 1 Sensor 3)
P0148	Fuel Delivery Error	
P0149	Fuel Timing Error	
P0150	O2 Sensor Circuit	(Bank 2 Sensor 1)
P0151	O2 Sensor Circuit Low Voltage	(Bank 2 Sensor 1)
P0152	O2 Sensor Circuit High Voltage	(Bank 2 Sensor 1)
P0153	O2 Sensor Circuit Slow Response	(Bank 2 Sensor 1)
P0154	O2 Sensor Circuit No Activity Detected	(Bank 2 Sensor 1)
P0155	O2 Sensor Heater Circuit	(Bank 2 Sensor 1)
P0156	O2 Sensor Circuit Malfunction	(Bank 2 Sensor 2)
P0157	O2 Sensor Circuit Low Voltage	(Bank 2 Sensor 2)
P0158	O2 Sensor Circuit High Voltage	(Bank 2 Sensor 2)
P0159	O2 Sensor Circuit Slow Response	(Bank 2 Sensor 2)
P0160	O2 Sensor Circuit No Activity Detected	(Bank 2 Sensor 2)
P0161	O2 Sensor Heater Circuit	(Bank 2 Sensor 2)
P0162	O2 Sensor Circuit Malfunction	(Bank 2 Sensor 3)
P0163	O2 Sensor Circuit Low Voltage	(Bank 2 Sensor 3)
P0164	O2 Sensor Circuit High Voltage	(Bank 2 Sensor 3)
P0165	O2 Sensor Circuit Slow Response	(Bank 2 Sensor 3)
P0166	O2 Sensor Circuit No Activity Detected	(Bank 2 Sensor 3)
P0167	O2 Sensor Heater Circuit	(Bank 2 Sensor 3)
P0168	Fuel Temperature Too High	
P0169	Incorrect Fuel Composition	
P0170	Fuel Trim	(Bank 1)
P0171	System too Lean	(Bank 1)
P0172	System too Rich	(Bank 1)
P0173	Fuel Trim Malfunction	(Bank 2)
P0174	System too Lean	(Bank 2)
P0175	System too Rich	(Bank 2)

P0176 Fuel Composition Sensor Circuit
P0177 Fuel Composition Sensor Circuit Range/Performance
P0178 Fuel Composition Sensor Circuit Low Input
P0179 Fuel Composition Sensor Circuit High Input
P0180 Fuel Temperature Sensor A Circuit
P0181 Fuel Temperature Sensor A Circuit Range/Performance
P0182 Fuel Temperature Sensor A Circuit Low Input
P0183 Fuel Temperature Sensor A Circuit High Input
P0184 Fuel Temperature Sensor A Circuit Intermittent
P0185 Fuel Temperature Sensor B Circuit
P0186 Fuel Temperature Sensor B Circuit Range/Performance
P0187 Fuel Temperature Sensor B Circuit Low Input
P0188 Fuel Temperature Sensor B Circuit High Input
P0189 Fuel Temperature Sensor B Circuit Intermittent
P0190 Fuel Rail Pressure Sensor Circuit
P0191 Fuel Rail Pressure Sensor Circuit Range/Performance
P0192 Fuel Rail Pressure Sensor Circuit Low In put
P0193 Fuel Rail Pressure Sensor Circuit High Input
P0194 Fuel Rail Pressure Sensor Circuit Intermittent
P0195 Engine Oil Temperature Sensor
P0196 Engine Oil Temperature Sensor Range/Performance
P0197 Engine Oil Temperature Sensor Low
P0198 Engine Oil Temperature Sensor High
P0199 Engine Oil Temperature Sensor Intermittent

P02XX Fuel and Air Metering

P0200 Injector Circuit
P0201 Injector Circuit - Cylinder 1
P0202 Injector Circuit - Cylinder 2
P0203 Injector Circuit - Cylinder 3
P0204 Injector Circuit - Cylinder 4
P0205 Injector Circuit - Cylinder 5
P0206 Injector Circuit - Cylinder 6
P0207 Injector Circuit - Cylinder 7
P0208 Injector Circuit - Cylinder 8
P0209 Injector Circuit - Cylinder 9
P0210 Injector Circuit - Cylinder 10
P0211 Injector Circuit - Cylinder 11
P0212 Injector Circuit - Cylinder 12
P0213 Cold Start Injector 1
P0214 Cold Start Injector 2
P0215 Engine Shutoff Solenoid
P0216 Injector/Injection Timing Control Circuit
P0217 Engine Coolant Over Temperature Condition
P0218 Transmission Fluid Over Temperature Condition
P0219 Engine Over Speed Condition
P0220 Throttle/Pedal Position Sensor/Switch “B” Circuit
P0221 Throttle/Pedal Position Sensor/Switch “B” Circuit Range/Performance Problem
P0222 Throttle/Pedal Position Sensor/Switch “B” Circuit Low Input
P0223 Throttle/Pedal Position Sensor/Switch “B” Circuit High Input
P0224 Throttle/Pedal Position Sensor/Switch “B” Circuit Intermittent
P0225 Throttle/Pedal Position Sensor/Switch “C” Circuit
P0226 Throttle/Pedal Position Sensor/Switch “C” Circuit Range/Performance Problem
P0227 Throttle/Pedal Position Sensor/Switch “C” Circuit Low Input
P0228 Throttle/Pedal Position Sensor/Switch “C” Circuit High Input
P0229 Throttle/Pedal Position Sensor/Switch “C” Circuit Intermittent
P0230 Fuel Pump Primary Circuit
P0231 Fuel Pump Secondary Circuit Low
P0232 Fuel Pump Secondary Circuit High
P0233 Fuel Pump Secondary Circuit Intermittent

P0234 Turbo/Super Charger Overboost Condition
P0235 Turbo/Super Charger Boost Sensor “A” Circuit
P0236 Turbo/Super Charger Boost Sensor “A” Circuit Range/Performance
P0237 Turbo/Super Charger Boost Sensor “A” Circuit Low
P0238 Turbo/Super Charger Boost Sensor “A” Circuit High
P0239 Turbo/Super Charger Boost Sensor “B” Circuit
P0240 Turbo/Super Charger Boost Sensor “B” Circuit Range/Performance
P0241 Turbo/Super Charger Boost Sensor “B” Circuit Low
P0242 Turbo/Super Charger Boost Sensor “B” Circuit High
P0243 Turbo/Super Charger Wastegate Solenoid “A”
P0244 Turbo/Super Charger Wastegate Solenoid “A” Range/Performance
P0245 Turbo/Super Charger Wastegate Solenoid “A” Low
P0246 Turbo/Super Charger Wastegate Solenoid “A” High
P0247 Turbo/Super Charger Wastegate Solenoid “B”
P0248 Turbo/Super Charger Wastegate Solenoid “B” Range/Performance
P0249 Turbo/Super Charger Wastegate Solenoid “B” Low
P0250 Turbo/Super Charger Wastegate Solenoid “B” High
P0251 Injection Pump Fuel Metering Control “A” (Cam/rotor/Injector)
P0252 Injection Pump Fuel Metering Control “A” Range/Performance (Cam/Rotor/Injector)
P0253 Injection Pump Fuel Metering Control “A” Low (Cam/Rotor/Injector)
P0254 Injection Pump Fuel Metering Control “A” High (Cam/Rotor/Injector)
P0255 Injection Pump Fuel Metering Control “A” Intermittent (Cam/Rotor/Injector)
P0256 Injection Pump Fuel Metering Control “B” (Cam/Rotor/Injector)
P0257 Injection Pump Fuel Metering Control “B” Range/Performance (Cam/Rotor/Injector)
P0258 Injection Pump Fuel Metering Control “B” Low (Cam/Rotor/Injector)
P0259 Injection Pump Fuel Metering Control “B” High (Cam/Rotor/Injector)
P0260 Injection Pump Fuel Metering Control “B” Intermittent (Cam/Rotor/Injector)
P0261 Cylinder 1 Injector Circuit Low
P0262 Cylinder 1 Injector Circuit High
P0263 Cylinder 1 Contribution/Balance
P0264 Cylinder 2 Injector Circuit Low
P0265 Cylinder 2 Injector Circuit High
P0266 Cylinder 2 Contribution/Balance
P0267 Cylinder 3 Injector Circuit Low
P0268 Cylinder 3 Injector Circuit High
P0269 Cylinder 4 Contribution/Balance
P0270 Cylinder 4 Injector Circuit Low
P0271 Cylinder 4 Injector Circuit High
P0272 Cylinder 4 Contribution/Balance
P0273 Cylinder 5 Injector Circuit Low
P0274 Cylinder 5 Injector Circuit High
P0275 Cylinder 5 Contribution/Balance
P0276 Cylinder 6Injector Circuit Low
P0277 Cylinder 6 Injector Circuit High
P0278 Cylinder 6 Contribution/Balance
P0279 Cylinder 7 Injector Circuit Low
P0280 Cylinder 7 Injector Circuit High
P0281 Cylinder 7 Contribution/Balance
P0282 Cylinder 8 Injector Circuit Low
P0283 Cylinder 8 Injector Circuit High
P0284 Cylinder 8 Contribution/Balance
P0285 Cylinder 9 Injector Circuit Low
P0286 Cylinder 9 Injector Circuit High
P0287 Cylinder 9 Contribution/Balance
P0288 Cylinder 10 Injector Circuit Low
P0289 Cylinder 10 Injector Circuit High
P0290 Cylinder 10 Contribution/Balance
P0291 Cylinder 11 Injector Circuit Low
P0292 Cylinder 11 Injector Circuit High
P0293 Cylinder 11 Contribution/Balance
P0294 Cylinder 12 Injector Circuit Low

P0295 Cylinder 12 Injector Circuit High
P0296 Cylinder 12 Contribution/Balance

P0298 Engine Oil Over Temperature

P03XX Ignition System or Misfire

P0300 Random/Multiple Cylinder Misfire Detected
P0301 Cylinder 1 Misfire Detected
P0302 Cylinder 2 Misfire Detected
P0303 Cylinder 3 Misfire Detected
P0304 Cylinder 4 Misfire Detected
P0305 Cylinder 5 Misfire Detected
P0306 Cylinder 6 Misfire Detected
P0307 Cylinder 7 Misfire Detected
P0308 Cylinder 8 Misfire Detected
P0309 Cylinder 9 Misfire Detected
P0310 Cylinder 10 Misfire Detected
P0311 Cylinder 11 Misfire Detected
P0312 Cylinder 12 Misfire Detected
P0313 Misfire Detected with Low Fuel
P0314 Single Cylinder Misfire (Cylinder not Specified)

P0320 Ignition/Distributor Engine Speed Input Circuit
P0321 Ignition/Distributor Engine Speed Input Circuit Range/Performance
P0322 Ignition/Distributor Engine Speed Input Circuit No Signal
P0323 Ignition/Distributor Engine Speed Input Circuit Intermittent
P0324 Knock Control System Error
P0325 Knock Sensor 1 Circuit (Bank 1 or Single Sensor)
P0326 Knock Sensor 1 Circuit Range/Performance (Bank 1 or Single Sensor)
P0327 Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)
P0328 Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)
P0329 Knock Sensor 1 Circuit Input Intermittent (Bank 1 or Single Sensor)
P0330 Knock Sensor 2 Circuit (Bank 2)
P0331 Knock Sensor 2 Circuit Range/Performance (Bank 2)
P0332 Knock Sensor 2 Circuit Low Input (Bank 2)
P0333 Knock Sensor 2 Circuit High Input (Bank 2)
P0334 Knock Sensor 2 Circuit Input Intermittent (Bank 2)
P0335 Crankshaft Position Sensor A Circuit
P0336 Crankshaft Position Sensor A Circuit Range/Performance
P0337 Crankshaft Position Sensor A Circuit Low Input
P0338 Crankshaft Position Sensor A Circuit High Input
P0339 Crankshaft Position Sensor A Circuit Intermittent
P0340 Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)
P0341 Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor)
P0342 Camshaft Position Sensor “A” Circuit Low Input (Bank 1 or Single Sensor)
P0343 Camshaft Position Sensor “A” Circuit High Input (Bank 1 or Single Sensor)
P0344 Camshaft Position Sensor “A” Circuit Intermittent (Bank 1 or Single Sensor)
P0345 Camshaft Position Sensor “A” Circuit (Bank 2)
P0348 Camshaft Position Sensor “A” Circuit Range/Performance (Bank 2)
P0347 Camshaft Position Sensor “A” Circuit Low Input (Bank 2)
P0348 Camshaft Position Sensor “A” Circuit High Input (Bank 2)
P0349 Camshaft Position Sensor “A” Circuit Intermittent (Bank 2)
P0350 Ignition Coil Primary/Secondary Circuit
P0351 Ignition Coil “A” Primary/Secondary Circuit
P0352 Ignition Coil “B” Primary/Secondary Circuit
P0353 Ignition Coil “C” Primary/Secondary Circuit
P0354 Ignition Coil “D” Primary/Secondary Circuit
P0355 Ignition Coil “F” Primary/Secondary Circuit
P0356 Ignition Coil “F” Primary/Secondary Circuit
P0357 Ignition Coil “G” Primary/Secondary Circuit
P0358 Ignition Coil “H” Primary/Secondary Circuit

P0359	Ignition Coil “I” Primary/Secondary Circuit	
P0360	Ignition Coil “J” Primary/Secondary Circuit	
P0361	Ignition Coil “K Primary/Secondary Circuit	
P0362	Ignition Coil “L’ Primary/Secondary Circuit	
P0365	Camshaft Position Sensor “B” Circuit	(Bank 1)
P0366	Camshaft Position Sensor “B” Circuit Range/Performance	(Bank 1)
P0367	Camshaft Position Sensor “B” Circuit Low Input	(Bank 1)
P0368	Camshaft Position Sensor “B” Circuit High Input	(Bank 1)
P0369	Camshaft Position Sensor “B” Circuit Intermittent	(Bank 1)
P0370	Timing Reference High Resolution Signal “A”	
P0371	Timing Reference High Resolution Signal “A” Too Many Pulses	
P0372	Timing Reference High Resolution Signal “A” Too Few Pulses	
P0373	Timing Reference High Resolution Signal “A” Intermittent/Erratic Pulses	
P0374	Timing Reference High Resolution Signal “A” No Pulse	
P0375	Timing Reference High Resolution Signal “B”	
P0376	Timing Reference High Resolution Signal “B” Too Many Pulses	
P0377	Timing Reference High Resolution Signal “B” Too Few Pulses	
P0378	Timing Reference High Resolution Signal “B” Intermittent/Erratic Pulses	
P0379	Timing Reference High Resolution Signal “B” No Pulses	
P0380	Glow Plug/Heater Circuit “A”	
P0381	Glow Plug/Heater Indicator Circuit	
P0382	Glow Plug/Heater Circuit “B”	
P0385	Crankshaft Position Sensor “B” Circuit	
P0386	Crankshaft Position Sensor “B” Circuit Range/Performance	
P0387	Crankshaft Position Sensor “B” Circuit Low Input	
P0388	Crankshaft Position Sensor “B” Circuit High Input	
P0389	Crankshaft Position Sensor “B” Circuit Intermittent	
P0390	camshaft Position Sensor “B” Circuit	
P0391	Camshaft Position Sensor “B” circuit Range/Performance	(Bank 2)
P0392	Camshaft Position Sensor “B” Circuit Low Input	(Bank 2)
P0393	Camshaft Position Sensor “B” Circuit High Input	(Bank 2)
P0394	Camshaft Position Sensor “B” Circuit Intermittent	(Bank 2)

P04XX Auxiliary Emission Controls

P0400	Exhaust Gas Recirculation Flow	
P0401	Exhaust Gas Recirculation Flow Insufficient Detected	
P0402	Exhaust Gas Recirculation Flow Excessive Detected	
P0403	Exhaust Gas Recirculation Control Circuit	
P0404	Exhaust Gas Recirculation Control Circuit Range/Performance	
P0405	Exhaust Gas Recirculation Sensor “A” Circuit Low	
P0406	Exhaust Gas Recirculation Sensor “A” Circuit High	
P0407	Exhaust Gas Recirculation Sensor “B” Circuit Low	
P0408	Exhaust Gas Recirculation Sensor “B” Circuit High	
P0409	Exhaust Gas Recirculation Sensor “A” Circuit	
P0410	Secondary Air Injection System	
P0411	Secondary Air Injection System Incorrect Flow Detected	
P0412	Secondary Air Injection System Switching Valve “A” Circuit	
P0413	Secondary Air Injection System Switching Valve “A” Circuit Open	
P0414	Secondary Air Injection System Switching Valve “A” Circuit Shorted	
P0415	Secondary Air Injection System Switching Valve “B” Circuit	
P0416	secondary Air Injection System Switching Valve “B’ Circuit Open	
P0417	secondary Air Injection System Switching Valve “B” Circuit Shorted	
P0416	Secondary Air Injection System Relay “A” Circuit	
P0419	Secondary Air injection System Relay “B” Circuit	
P0420	Catalyst System Efficiency Below Threshold	(Bank 1)
P0421	Warm Up Catalyst Efficiency Below Threshold	(Bank 1)
P0422	Main Catalyst Efficiency Below Threshold	(Bank 1)
P0423	Heated Catalyst Efficiency Below Threshold	(Bank 1)
P0424	Heated Catalyst Temperature Below Threshold	(Bank 1)

P0425	Catalyst Temperature Sensor	(Bank 1)
P0426	Catalyst Temperature Sensor Range/Performance	(Bank 1)
P0427	Catalyst Temperature Sensor Low Input	(Bank 1)
P0428	Catalyst Temperature Sensor High Input	(Bank 1)
P0429	Catalyst Heater Control Circuit	(Bank 1)
P0430	Catalyst System Efficiency Below Threshold	(Bank 2)
P0431	Warm Up Catalyst Efficiency Below Threshold	(Bank 2)
P0432	Main Catalyst Efficiency Below Threshold	(Bank 2)
P0433	Heated Catalyst Efficiency Below Threshold	(Bank 2)
P0434	Heated Catalyst Temperature Below Threshold	(Bank 2)
P0435	Catalyst Temperature Sensor	(Bank 2)
P0436	Catalyst Temperature Sensor Range/Performance	(Bank 2)
P0437	Catalyst Temperature Sensor Low Input	(Bank 2)
P0438	Catalyst Temperature Sensor High Input	(Bank 2)
P0439	Catalyst Heater Control Circuit	(Bank 2)
P0440	Evaporative Emission Control System	
P0441	Evaporative Emission Control System Incorrect Purge Flow	
P0442	Evaporative Emission Control System Leak Detected (small leak)	
P0443	Evaporative Emission Control System Purge Control Valve Circuit	
P0444	Evaporative Emission Control System Purge Control Valve Circuit Open	
P0445	Evaporative Emission Control System Purge Control Valve Circuit Shorted	
P0446	Evaporative Emission Control System Vent Control Circuit	
P0447	Evaporative Emission Control System Vent Control Circuit Open	
P0448	Evaporative Emission Control System Vent Control Circuit Shorted	
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P0450	Evaporative Emission Control System Pressure Sensor	
P0451	Evaporative Emission Control System Pressure Sensor Range/Performance	
P0452	Evaporative Emission Control System Pressure Sensor Low Input	
P0453	Evaporative Emission Control System Pressure Sensor High input	
P0454	Evaporative Emission Control System Pressure Sensor Intermittent	
P0455	Evaporative Emission Control System Leak Detected (gross leak)	
P0456	Evaporative Emission Control System Leak Detected (very small leak)	
P0457	Evaporative Emission Control System Leak Detected (fuel cap loose/off)	
P0460	Fuel Level Sensor Circuit	
P0461	Fuel Level Sensor Circuit Range/Performance	
P0462	Fuel Level Sensor Circuit Low Input	
P0463	Fuel Level Sensor Circuit High Input	
P0464	Fuel Level Sensor Circuit Intermittent	
P0465	EVAP Purge Flow Sensor Circuit	
P0466	EVAP Purge Flow Sensor Circuit Range/Performance	
P0467	EVAP Purge Flow Sensor Circuit Low Input	
P0468	EVAP Purge Flow Sensor Circuit High Input	
P0469	EVAP Purge Flow Sensor Circuit Intermittent	
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P0471	Exhaust Pressure Sensor Range/Performance	
P0472	Exhaust Pressure Sensor Low	
P0473	Exhaust Pressure Sensor High	
P0474	Exhaust Pressure Sensor Intermittent	
P0475	Exhaust Pressure Control Valve	
P0476	Exhaust Pressure Control Valve Range/Performance	
P0477	Exhaust Pressure Control Valve Low	
P0478	Exhaust Pressure Control Valve High	
P0479	Exhaust Pressure Control Valve Intermittent	
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P0481	Cooling Fan 2 Control Circuit	
P0482	Cooling Fan 3 Control Circuit	
P0483	Cooling Fan Rationality Check	
P0484	Cooling Fan Circuit Over Current	
P0485	Cooling Fan Power/Ground Circuit	
P0486	Exhaust Gas Recirculation Sensor “B” Circuit	
P0487	Exhaust Gas Recirculation Throttle Position Control Circuit	
P0488	Exhaust Gas Recirculation Throttle Position Control Range/Performance	

P0491	Secondary Air Injection System	(Bank 1)
P0492	Secondary Air Injection System	(Bank 2)

P05XX Vehicle Speed, Idle Control, and Auxiliary Inputs

P0500	Vehicle Speed Sensor	
P0501	Vehicle Speed Sensor Range/Performance	
P0502	Vehicle Speed Sensor Circuit Low Input	
P0503	Vehicle Speed Sensor Intermittent/Erratic/High	
P0505	Idle Control System	
P0506	Idle Control System RPM Lower Than Expected	
P0507	Idle Control System RPM Higher Than Expected	
P0508	Idle Control System Circuit Low	
P0509	Idle Control System Circuit High	
P0510	Closed Throttle Position Switch	
P0512	Starter Request Circuit	
P0513	Incorrect Irnmobilizer Key (“Immobilizer pending SAE J1930 approval)	
P0515	Battery Temperature Sensor Circuit	
P0516	Battery Temperature Sensor Circuit Low	
P0517	Battery Temperature Sensor Circuit High	
P0520	Engine Oil Pressure Sensor/Switch Circuit	
P0521	Engine Oil Pressure Sensor/Switch Range/Performance	
P0522	Engine Oil Pressure Sensor/Switch Low Voltage	
P0523	Engine Oil Pressure Sensor/Switch High Voltage	
P0524	Engine Oil Pressure Too Low	
P0530	A/C Refrigerant Pressure Sensor Circuit	
P0531	A/C Refrigerant Pressure Sensor Circuit Range/Performance	
P0532	A/C Refrigerant Pressure Sensor Circuit Low Input	
P0533	A/C Refrigerant Pressure Sensor Circuit High Input	
P0534	Air Conditioner Refrigerant Charge Loss	
P0540	Intake Air Heater Circuit	
P0541	Intake Air Heater Circuit Low	
P0542	Intake Air Heater Circuit High	
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P0545	Exhaust Gas Temperature Sensor Circuit Low	(Bank 1)
P0546	Exhaust Gas Temperature Sensor Circuit High	(Bank 1)
P0547	Exhaust Gas Temperature Sensor Circuit	(Bank 2)
P0548	Exhaust Gas Temperature Sensor Circuit Low	(Bank 2)
P0549	Exhaust Gas Temperature Sensor Circuit High	(Bank 2)
P0550	Power Steering Pressure Sensor Circuit	
P0551	Power Steering Pressure Sensor Circuit Range/Performance	
P0552	Power Steering Pressure Sensor Circuit Low Input	
P0553	Power Steering Pressure Sensor Circuit High Input	
P0554	Power Steering Pressure Sensor Circuit Intermittent	
P0560	System Voltage	
P0561	System Voltage Unstable	
P0562	System Voltage Low	
P0563	System Voltage High	
P0564	Cruise Control Multi-Function Input Signal	
P0565	Cruise Control On Signal	
P0566	Cruise Control Off Signal	
P0567	Cruise Control Resume Signal	
P0568	Cruise Control Set Signal	
P0569	Cruise Control Coast Signal	
P0570	Cruise Control Accel Signal	
P0571	Cruise Control/Brake Switch A Circuit	

P0572 Cruise Control/Brake Switch A Circuit Low
P0573 Cruise Control/Brake Switch A Circuit High
P0574 Cruise Control System - Vehicle Speed Too High
P0575 Cruise Control Input Circuit
P0576 Cruise Control Input Circuit Low
P0577 Cruise Control input Circuit High
P0578 through P0580 Reserved for Cruise Control Codes

P06XX Computer and Auxiliary Inputs

P0600 Serial Communication Link
P0601 Internal Control Module Memory Check Sum Error
P0602 Control Module Programming Error
P0603 Internal Control Module Keep Alive Memory (KAM) Error
P0604 Internal Control Module Random Access Memory (RAM) Error
P0605 Internal Control Module Read Only Memory (ROM) Error (Module Identification Defined by SAE J1979)

P0606 ECM/PCM Processor
P0607 Control Module Performance
P0608 Control Module VSS Output "A"
P0609 Control Module VSS Output "B"
P0610 Control Module Vehicle Options Error

P0615 Starter Relay Circuit
P0616 Starter Relay Circuit Low
P0617 Starter Relay Circuit High
P0618 Alternative Fuel Control Module KAM Error
P0619 Alternative Fuel Control Module RAM/ROM Error
P0620 Generator Control Circuit
P0621 Generator Lamp "L" Terminal Control Circuit
P0622 Generator Field "F" Terminal Control Circuit
P0623 Generator Lamp Control Circuit
P0624 Fuel Cap Lamp Control Circuit

P0630 VIN Not Programmed or Mismatch - ECM/PCM
P0631 VIN Not Programmed or Mismatch - TCM

P0635 Power Steering Control Circuit
P0836 Power Steering Control Circuit Low
P0637 Power Steering Control Circuit High
P0638 Throttle Actuator Control Range/Performance (Bank 1)
P0639 Throttle Actuator Control Range/Performance (Bank 2)
P0640 Intake Air Heater Control Circuit

P0645 A/C Clutch Relay Control Circuit
P0646 A/C Clutch Relay Control Circuit Low
P0647 A/C Clutch Relay Control Circuit High
P0648 Immobilizer Lamp Control Circuit ("Immobilizer" pending SAE J1930 approval)
P0649 Speed Control Lamp Control Circuit
P0650 Malfunction Indicator Lamp (ML) Control Circuit

P0654 Engine RPM Output Circuit
P0655 Engine Hot Lamp Output Control Circuit
P0656 Fuel Level Output Circuit

P0660 Intake Manifold Tuning Valve Control Circuit (Bank 1)
P0661 Intake Manifold Tuning Valve Control Circuit Low (Bank 1)
P0662 Intake Manifold Tuning Valve Control Circuit High (Bank 1)
P0663 Intake Manifold Tuning Valve Control Circuit (Bank 2)
P0664 Intake Manifold Tuning Valve Control Circuit Low (Bank 2)
P0665 Intake Manifold Tuning Valve Control Circuit High (Bank 2)

P07XX Transmission

P0700	Transmission Control System (MIL Request)
P0701	Transmission Control System Range/Performance
P0702	Transmission Control System Electrical
P0703	Torque Converter/Brake Switch B Circuit
P0704	Clutch Switch In put Circuit Malfunction
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)
P0706	Transmission Range Sensor Circuit Range/Performance
P0707	Transmission Range Sensor Circuit Low Input
P0708	Transmission Range Sensor Circuit High Input
P0709	Transmission Range Sensor Circuit intermittent
P0710	Transmission Fluid Temperature Sensor Circuit
P0711	Transmission Fluid Temperature Sensor Circuit Range/Performance
P0712	Transmission Fluid Temperature Sensor Circuit Low Input
P0713	Transmission Fluid Temperature Sensor Circuit High Input
P0714	Transmission Fluid Temperature Sensor Circuit Intermittent
P0715	Input/Turbine Speed Sensor Circuit
P0716	input/Turbine Speed Sensor Circuit Range/Performance
P0717	Input/Turbine Speed Sensor Circuit No Signal
P0718	Input/Turbine Speed Sensor Circuit Intermittent
P0719	Torque Converter/Brake Switch B Circuit Low
P0720	Output Speed Sensor Circuit
P0721	Output Speed Sensor Circuit Range/Performance
P0722	Output Speed Sensor Circuit No Signal
P0723	Output Speed Sensor Circuit Intermittent
P0724	Torque Converter/Brake Switch B Circuit High
P0725	Engine Speed Input Circuit
P0726	Engine Speed Input Circuit Range/Performance
P0727	Engine Speed Input Circuit No Signal
P0728	Engine Speed Input Circuit Intermittent
P0730	Incorrect Gear Ratio
P0731	Gear 1 Incorrect Ratio
P0732	Gear 2 Incorrect Ratio
P0733	Gear 3 Incorrect Ratio
P0734	Gear 4 Incorrect Ratio
P0735	Gear 5 Incorrect Ratio
P0736	Reverse Incorrect Ratio
P0737	TCM Engine Speed Output Circuit
P0739	TCM Engine Speed Output Circuit Low
P0739	TCM Engine Speed Output Circuit High
P0740	Torque Converter Clutch Circuit
P0741	Torque Converter Clutch Circuit Performance or Stuck Off
P0742	Torque Converter Clutch Circuit Stuck On
P0743	Torque Converter Clutch Circuit Electrical
P0744	Torque Converter Clutch Circuit Intermittent
P0745	Pressure Control Solenoid “A”
P0746	Pressure Control Solenoid “A” Performance or Stuck Off
P0747	Pressure Control Solenoid “A” Stuck On
P0748	Pressure Control Solenoid “A” Electrical
P0749	Pressure Control Solenoid “A” Intermittent
P0750	Shift Solenoid “A”
P0751	Shift Solenoid “A” Performance or Stuck Off
P0752	Shift Solenoid “A” Stuck On
P0753	Shift Solenoid “A” Electrical
P0754	Shift Solenoid “A” Intermittent
P0765	Shift Solenoid “B”
P0756	Shift Solenoid “B” Performance or Stuck Off
P0757	Shift Solenoid “B” Stuck On
P0758	Shift Solenoid “B” Electrical
P0759	Shift Solenoid “B” Intermittent
P0760	Shift Solenoid “C”

P0761 Shift Solenoid “C” Performance or Stuck Off
P0762 Shift Solenoid “C” Stuck On
P0763 Shift Solenoid “C” Electrical
P0764 Shift Solenoid “C” Intermittent
P0765 Shift Solenoid “C”
P0766 Shift Solenoid “D” Performance or Stuck Off
P0767 Shift Solenoid “D” Stuck On
P0768 Shift Solenoid “D” Electrical
P0769 Shift Solenoid “D” Intermittent
P0770 Shift Solenoid “E”
P0771 Shift Solenoid “E” Performance or Stuck Off
P0772 Shift Solenoid “E” Stuck On
P0773 Shift Solenoid “E” Electrical
P0774 Shift Solenoid “E” Intermittent
P0775 Pressure Control Solenoid “B”
P0776 Pressure Control Solenoid “B” Performance or Stuck Off
P0777 Pressure Control Solenoid “B” Stuck On
P0778 Pressure Control Solenoid “B” Electrical
P0779 Pressure Control Solenoid “B” Intermittent
P0780 Shift
P0781 1-2 Shift
P0782 2-3 Shift
P0783 3-4 Shift
P0784 4-5 Shift
P0785 Shift/Timing Solenoid
P0786 Shift/Timing Solenoid Range/Performance
P0787 Shift/Timing Solenoid Low
P0788 Shift/Timing Solenoid High
P0789 Shift/Timing Solenoid Intermittent
P0790 Normal/Performance Switch Circuit
P0791 Intermediate Shaft Speed Sensor Circuit
P0792 Intermediate Shaft Speed Sensor Circuit Range/Performance
P0793 Intermediate Shaft Speed Sensor Circuit No Signal
P0794 Intermediate Shaft Speed Sensor Circuit Intermittent
P0795 Pressure Control Solenoid “C”
P0796 Pressure Control Solenoid “C” Performance or Stuck off
P0797 Pressure Control Solenoid “C” Stuck On
P0798 Pressure Control Solenoid “C” Electrical
P0799 Pressure Control Solenoid “C” Intermittent

P08XX Transmission

P0801 Reverse Inhibit Control Circuit

P0803 1-4 Upshift (Skip Shift) Solenoid Control Circuit
P0804 1-4 Upshift (Skip Shift) Lamp Control Circuit
P0805 Clutch Position Sensor Circuit
P0806 Clutch Position Sensor Circuit Range/Performance
P0807 Clutch Position Sensor Circuit Low
P0808 Clutch Position Sensor Circuit High
P0809 Clutch Position Sensor Circuit Intermittent
P0810 Clutch Position Control Error
P0811 Excessive Clutch Slippage
P0812 Reverse Input Circuit
P0813 Reverse Output Circuit
P0814 Transmission Range Display Circuit
P0815 Upshift Switch Circuit
P0816 Downshift Switch Circuit
P0817 Starter Disable Circuit
P0818 Driveline Disconnect Switch Input Circuit

P0820 Gear Lever X-Y Position Sensor Circuit

P0821 Gear Lever X Position Circuit
P0822 Gear Lever Y Position Circuit
P0823 Gear Lever X Position Circuit Intermittent
P0824 Gear Lever Y Position Circuit Intermittent
P0825 Gear Lever Push-Pull Switch (Shift Anticipate)

P0830 Clutch Pedal Switch "A" Circuit
P0831 Clutch Pedal Switch "A" Circuit Low
P0832 Clutch Pedal Switch "A" Circuit High
P0833 Clutch Pedal Switch "B" Circuit
P0834 Clutch Pedal Switch "B" Circuit Low
P0835 Clutch Pedal Switch "B" Circuit High
P0836 Four Wheel Drive (4WD) Switch Circuit
P0837 Four Wheel Drive (4WD) Switch Circuit Range/Performance
P0838 Four Wheel Drive (4WD) Switch Circuit Low
P0839 Four Wheel Drive (4WD) Switch Circuit High
P0840 Transmission Fluid Pressure Sensor/Switch "A" Circuit
P0841 Transmission Fluid Pressure Sensor/Switch "A" Circuit Range/Performance
P0842 Transmission Fluid Pressure Sensor/Switch "A" Circuit Low
P0843 Transmission Fluid Pressure Sensor/Switch "A" Circuit High
P0844 Transmission Fluid Pressure Sensor/Switch "A" Circuit Intermittent
P0845 Transmission Fluid Pressure Sensor/Switch "B" Circuit
P0846 Transmission Fluid Pressure Sensor/Switch "B" Circuit Range/Performance
P0847 Transmission Fluid Pressure Sensor/Switch "B" Circuit Low
P0848 Transmission Fluid Pressure Sensor/Switch "B" Circuit High
P0849 Transmission Fluid Pressure Sensor/Switch "B" Circuit Intermittent

Additional Diagnostic Trouble Code Ranges

Other DTC ranges are defined for either manufacturer specific codes or under the control of SAE (Society of Automotive Engineers) and not yet defined. This section documents these additional ranges. Refer to your vehicle's repair manual for manufacturer specific Diagnostic Trouble Codes.

P09XX Transmission

P1XXX Manufacturer Controlled

P10XX Fuel and Air Metering and Auxiliary Emission Controls

P11XX Fuel and Air Metering

P12XX Fuel and Air Metering

P13XX Ignition System or Misfire

P14XX Auxiliary Emission Controls

P15XX Vehicle Speed, Idle Control, and Auxiliary Inputs

P16XX Computer and Auxiliary Outputs

P17XX Transmission

P18XX Transmission

P19XX Transmission

P2XXX SAE Controlled DTCs

P20XX Fuel and Air Metering and Auxiliary Emission Controls

P21XX Fuel and Air Metering and Auxiliary Emission Controls

P22XX Fuel and Air Metering and Auxiliary Emission Controls

P23XX Ignition System or Misfire

P24XX SAE Reserved

P25XX SAE Reserved

P26XX SAE Reserved

P27XX SAE Reserved

P28XX SAE Reserved

P29XX SAE Reserved

P3XX Manufacturer Controlled and SAE Reserved

P30XX Fuel and Air Metering and Auxiliary Emission Controls

P31XX Fuel and Air Metering and Auxiliary Emission Controls

P32XX Fuel and Air Metering and Auxiliary Emission Controls

P33XX Ignition System Misfire

P34XX SAE Reserved

P35XX SAE Reserved

P36XX SAE Reserved

P37XX SAE Reserved

P38XX SAE Reserved

P39XX SAE Reserved

APPENDIX B

Support

Technical support is offered on our products via email. Please note technical support cannot assist you in diagnosing and repairing your vehicle. Support is limited to operation of the scan tool only.

When contacting technical support please provide the following information:

- Year of Vehicle (e.g. 2004)
- Make (e.g. Acura)
- Model (e.g. RSX)
- Problem encountered, be specific as possible. List any error messages displayed by the software.
- Version of Nology software located at: Help Options | About Laptop-Dyno... menu.

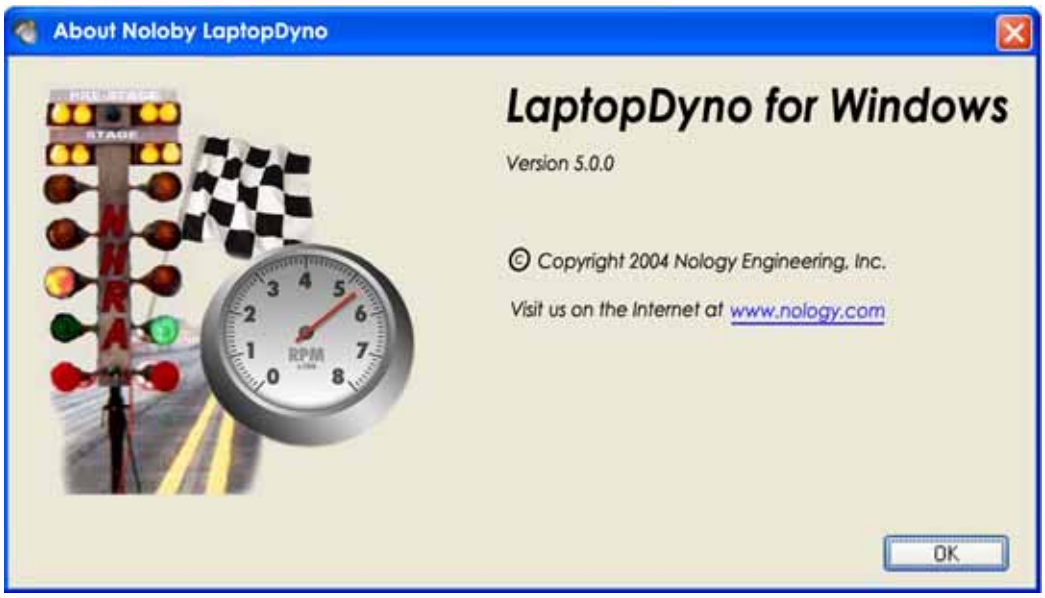

Figure 32: About Nology Laptop-Dyno™ Dialog

Technical support is provided at: 1-800-NOLOGY1

APPENDIX C

Warranty Information

Nology warranties the Laptop-Dyno™ for Windows hardware for 1 year. Damage caused by misuse or modification is not covered.

Nology is not responsible for damage to vehicle caused by misuse or otherwise. Nology's sole liability is limited to the repair or replacement of the scan tool while under warranty.

30-day money back guarantee. If for any reason you are not satisfied with the Nology Laptop-Dyno™ for Windows, you can return it to Nology for a refund less shipping charges. The 30-day money back guarantee only applies to purchases made from our website. Nology resellers have their own return policies.

The scan tool must be undamaged and contain all original packing, supplied materials, and the original receipt or packing slip. No refunds if the scan tool arrives at Nology after 30-days. Call Nology for a Return Authorization Number (RAN) before returning. Returns received without a RA number cannot be accepted.

When contacting Nology for a RA number please provide the following information:

- Reason for returning
- Year of Vehicle (e.g. 2004)
- Make (e.g. Acure)
- Model (e.g. RSX)
- Problem encountered, if any.

Nology Engineering, Inc.
1945 S. Rancho Santa Fe Rd.
San Marcos, CA 92078
Tel. 760-591-0888
Fax. 760-591-0880
ATTN: RAN Request

Or email for a RAN: sales@nology.com

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